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PETROLEUM REFINER and The REFINERY CATALOG for the refining-natural gasoline industry

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WORLD OIL

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CRITICAL YEAR AHEAD

THE NEXT YEAR or two unquestionably will be one of the most significant times in U. S. petroleum history. Tremendous problems must be overcome to provide enough oil to satisfy soaring consumptive requirements. Nevertheless, supply difficulties are not the most critical or far-reaching question confronting oil men. *More important is the matter of government and public thinking toward oil.*

The latter is likely to have a far greater future bearing on the basic principles and operating pattern of the business than are current economic troubles, which can be solved within a reasonable length of time with sufficient steel to permit adequate expansion of the industry's facilities.

Although the people of this country continue to enjoy the largest and cheapest supply of oil in the world, events of the past few months presage that the petroleum industry faces the stiffest fight of its existence in combatting the efforts of those who desire to impose government control oyer it.

None of the numerous previous periods of alarm over the possible exhaustion of the petroleum resources of the U. S. will begin to compare in magnitude with the one now in the making. Many government officials—state and federal—are telling the American people that the petroleum supply of the country has been depleted to the point the nation cannot fight another war. Some are advocating that the U. S. buy its petroleum requirements from foreign countries. Some are saying absolute government control is the only answer. Some are asserting the only salvation is the building of a gigantic synthetic liquid fuels industry. All this is being done under the fine-sounding theme of conserving our domestic supplies until needed for national security purposes in the future. One has only to read the daily newspapers to know about these scare headlines.

The shortage of petroleum products this winter in some regions of the country has made a large proportion of the people susceptible to such views. People chilly or out of work for lack of oil, even if for short periods of time, will expect remedial action. Even 1 percent of our population is nearly 1½ million people, sufficient that the pressure on the federal administration and the Congress to impose some sort of government regulation may not be brushed aside easily. A dozen congressional committees already are studying various phases of the industry, and speeches discussing the petroleum situation have become quite common on the floor of both the Senate and the House.

In the confusion which will result, ill-considered and highly dangerous policies may spring up and flourish, choking out the valuable fruits of the long, past experiences of the industry. The result might be a completely new operating pattern for petroleum.

The No. 1 job of all in the industry is selling the American people on the worth and value to them of a petroleum industry operating under the competitive enterprise system as heretofore. Never before has it been so extremely important to inform the people what the industry is doing to supply demand and to demonstrate the reasons for current supply shortages.

Only through vigorous and intensive action can the assembly of forces seeking to impose government regulation be forestalled. The responsibility doesn't belong just to company officials or to the advertising departments of big companies. Everybody working in the industry must help. All are in this together. If drastic government regulation comes, it will come alike to the good and the bad, to the small and the large, to the bosses and the employes. All branches of the industry and all men and women employed in them will be affected adversely.

There are 1¼ million people employed in the oil industry. What they say to their families, friends and business acquaintances, carries far greater weight than anything seen in print or heard on the radio. So, from now on everybody associated with the oil industry should start talking shop for all he is worth. If each person in the petroleum business would make but one public relations contact a month with people outside the industry, the total would be 15 million contacts a year.

By providing plain, unvarnished truth a good opinion of the industry can be implanted in the minds of the majority of the people. An accurately informed American public can be expected to act intelligently, and thus jobs, salaries, working conditions and other stakes in the oil industry can be protected for all.

At the very same time, the nation's security and the standard of living for everybody can be aided by protecting a business which has given this country more than any other nation has ever enjoyed. The success of such a program depends upon everyone doing his full share. Oil people have a wonderful story to tell, but they haven't been telling their story. It is time that the story be told—and in enough places to do some good.

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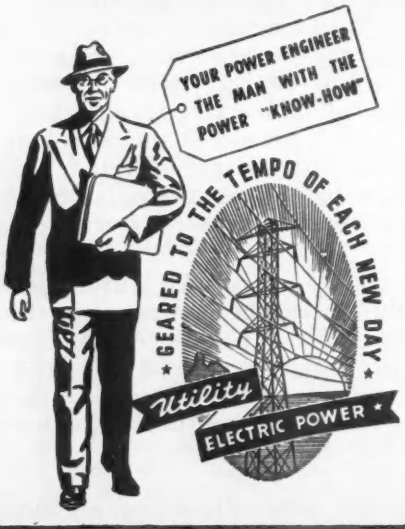

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The Changing Panorama
—1947-1948—

By WARREN L. BAKER
Editor

THE world's use of oil is increasing far more rapidly than contemplated, creating such an unusually sharp growth in consumption that every barrel of oil which can possibly be produced and refined during the next several years will be needed to supply demand. Consequently, the industry can look forward to the future with assurance that production, refining and sales levels will be in excess of new all-time peaks established in 1947.

Under normal conditions, such prospects, especially when coupled with the existence of the highest prices in more than 25 years, would mean a trouble-free and exceedingly bright economic period. However, the industry found itself up against a big and tough job in supplying enough oil the past year, and faces an equally difficult task in this respect in the year ahead.

Supply Shortages Experienced

Occurrence of an amazing growth in consumption at a time when limited quantities of steel had retarded development and expansion below desirable levels for more than five years completely reversed the industry's 20-year problem of operating with excessive producing ability. For the first occasion in peacetime history, the industry experienced difficulties last year in increasing supplies of products rapidly enough to meet soaring consumer wants.

This was particularly true in the case of the U. S., where stringent production proration had been enforced since the late 20's. Today the U. S. is producing such record quantities as to tax the capacity of existing transportation systems and approach the limits of present producing wells. Consumers desire such big volumes of products that efficient refining operations have had to be disregarded so plants can operate at physical limits.

Rising consumption thrust upon the industry a supply responsibility which became increasingly critical as the weeks and months rolled by in 1947, finally reaching such an acute stage that some homes and factories were temporarily without heating oils in parts of the U. S. during the current winter. By the first month of 1948, oil companies found it necessary to impose voluntary consumer distribution controls for the purpose of allocating supplies in the North Atlantic and Middle West states, to urge consumers to use less oil, and to adopt an industry program for increasing supplies of heating oils.

The abnormal position of being unable to fully meet all potential demand also is to characterize 1948. Inability to procure all the steel desired will prevent the industry from installing enough additional facilities to completely overcome all shortages at any early date. However, the situation is not expected to become more acute than at present. New production, transportation and refining facilities henceforth should be placed in operation fast enough to keep abreast of increase in demand. Therefore, scarcities should be held to a local and temporary basis.

With the industry forced to do all it can to provide increased quantities of heating oils to take care of the unusually large growth in consumption of these products, there was a possibility of a gasoline shortage developing by next summer. Upward adjustment of refinery distillate production can be accomplished only by cutting down the yield of motor fuels.

Great Political Significance

No other business is meeting such an increase in consumption so adequately as the American petroleum industry. Nevertheless, the development of a petroleum shortage in the U. S., heretofore always accustomed to a plentiful supply whenever needed, created great alarm over the oil resources of the nation. Consequently, 1948 will be marked by intensive government investigation of the petroleum situation.

Amidst dire warnings of inadequate supply sources to meet future needs from military heads, members of Congress and other government officials, came recommendations for government control of the industry, for buying the country's requirements abroad, and for building a gigantic synthetic liquid fuels industry. More and more such talk is to be heard during the year. A dozen Congressional committees and subcommittees, already studying the situation in 1947, are certain to step up their activity.

The result might be the establishment of national policies completely different from past petroleum operating patterns of this country, and consequently, 1948 will be a most significant year for the oil business.

Expansion Limitations Are Cause

Cause of the present plight of the industry is the natural result of wartime limitations on drilling and construction, plus the postwar shortage of steel equipment which continues to retard expansion at a time when exceptionally large increases have occurred in consumption. The solution is the enlargement of the petroleum facilities, including the drilling of more wells to increase producing ability, the building of new pipe line systems to transport larger volumes needed, and the construction of new refining facilities to convert bigger quantities of crude oil into usable products for consumers.

The factor most seriously retarding prospects

of the industry fulfilling its heavy responsibilities is the inability to obtain sufficient quantities of steel to complete expansion plans quickly enough. The oil business, like any other, cannot produce substantially larger peak supplies unless able to obtain materials necessary for the enlargement of the facilities it uses.

Again in 1948 operators will be confronted with the necessity of scrambling to get tubular goods and line pipe. Although record quantities of steel probably will be received during 1948, the increase will not be sufficient to drill all the wells or lay all the pipe lines that companies desire.

Amazing Demand Growth

As users have turned to petroleum for fuel in greater numbers than ever before, consumer thirst for oil has skyrocketed to the highest level in history.

World demand in 1947 attained the staggering total of more than 8,647,000 barrels daily (almost 3 billion barrels annually) up 11.2 percent or 1,126,000 barrels per day over 1946 and greater by ¾ million barrels than the daily average consuming rate in 1941. The U. S. alone used slightly more oil than the entire world before the war. U. S. domestic consumption (exclusive of exports) was 5,451,000 barrels daily in 1947, a gain of more than ½ million barrels daily above the previous year and one-third greater than in 1941.

Further increases in consumption are certain in 1948 and other coming years. The industry will continue to be asked to make unprecedented volumes available to consumers. U. S. consumption in 1948 is expected to be 5 percent or nearly 300,000 barrels a day larger than in 1947, and to continue upward to 6,629,000 barrels by 1951, which would be almost double the 1939 rate. Meanwhile, consumption outside the U. S. is rising even more swiftly, with the result that world demand by 1951 will reach 11 1/3 million barrels daily, twice the 1940 rate.

Tremendous Task Ahead

Such a prospective increase in consumption rates poses a tremendous task for the industry. In approximately 80 years prior to 1940, the petroleum industry built a capacity capable of supplying the world with 5½ million barrels a day of oil products. Now it is called on to double its capacity between 1940 and 1951, and thus must do in a dozen years what previously took 80 to accomplish.

In an effort to relieve the supply shortage, the industry has under way its greatest expansion program in all history. During 1947 and 1948 oil companies will invest over $5 billion in new facilities. The magnitude of this program is hard to grasp, for it represents the expenditure of nearly one-fifth of all the money invested by the industry up to the end of 1946.

Prospective consumption increases show that the investment in petroleum facilities must be increased about 50 percent by 1951 or 1952.

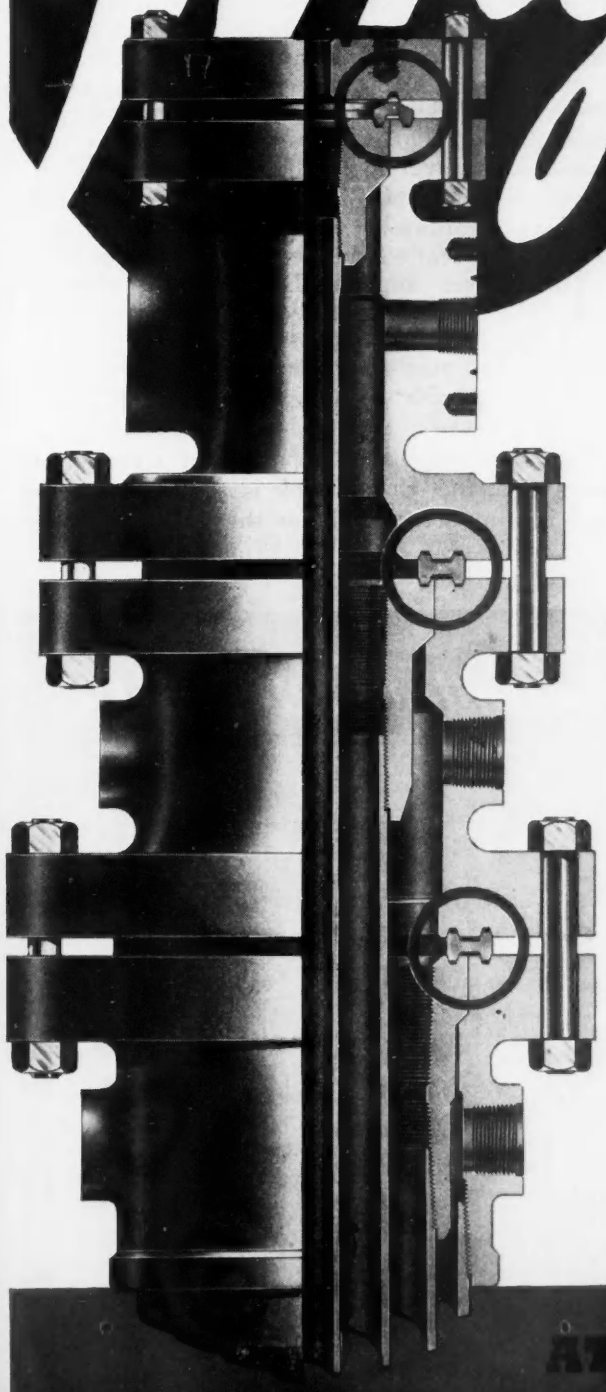
Sharp Production Growth

Under existing conditions, crude oil necessarily has been produced at unprecedented rates and must

Salient Annual Statistics of the United States, Part 1.

ITEM	THOUSANDS OF BARRELS, EXCEPT AS NOTED							
	1947	% Diff. '46-'47	1946	1945	1944	1943	1942	1941
Total Demand, (All Oils)	**2,156,843**	**+ 11.0**	**1,942,165**	**1,955,668**	**1,878,879**	**1,671,383**	**1,566,815**	**1,594,609**
(Daily Average)	5,909	+ 11.0	5,321	5,358	5,134	4,579	4,293	4,369
Crude Oil Demand	1,953,034	+ 7.7	1,812,573	1,789,892	1,743,979	1,510,829	1,410,808	1,471,771
(Daily Average)	5,351	+ 7.7	4,966	4,904	4,765	4,139	3,865	4,032
Motor Fuel Demand	840,856	+ 7.8	780,222	784,392	733,019	619,815	624,207	694,588
(Daily Average)	2,304	+ 7.8	2,137	2,149	2,003	1,698	1,710	1,903
Kerosine Demand	111,467	+ 14.1	97,725	81,753	76,700	73,350	72,343	72,690
(Daily Average)	305	+ 14.1	268	224	210	201	198	199
Residual Fuel Oil Demand	529,400	+ 8.8	486,637	535,092	524,556	481,902	417,792	397,536
(Daily Average)	1,450	+ 8.8	1,333	1,466	1,433	1,320	1,145	1,089
Distillate Fuel Oil Demand	326,985	+ 20.1	272,318	259,580	252,811	233,067	207,236	189,749
(Daily Average)	896	+ 20.1	746	711	691	639	568	520
Lubricating Oils Demand	50,622	+ 10.2	45,942	41,909	41,072	40,322	37,329	40,179
(Daily Average)	139	+ 10.2	126	115	112	110	102	110
Domestic Demand, Total	**1,989,786**	**+ 11.1**	**1,790,961**	**1,772,685**	**1,671,263**	**1,521,426**	**1,449,908**	**1,485,779**
(Daily Average)	5,451	+ 11.1	4,907	4,857	4,566	4,168	3,972	4,071
Exports, Total	**167,057**	**+ 10.5**	**151,204**	**182,983**	**207,616**	**149,957**	**116,907**	**108,830**
(Daily Average)	458	+ 10.5	414	501	567	411	320	298
Crude Oil Exports	46,034	+ 13.0	40,750	42,998	34,238	41,342	33,834	33,238
(Daily Average)	126	+ 13.0	112	90	93	113	93	91
Refined Oil Exports	121,023	+ 9.6	110,454	149,985	173,378	108,615	83,073	75,592
(Daily Average)	332	+ 9.6	302	411	474	289	227	207
Crude Oil Production	**1,853,166**	**+ 6.9**	**1,733,424**	**1,713,655**	**1,677,904**	**1,505,613**	**1,386,645**	**1,402,228**
(Daily Average)	5,077	+ 6.9	4,749	4,695	4,584	4,125	3,799	3,842
Value at Wells, $ Thousand	3,609,533	+ 46.6	2,461,462	2,094,250	2,032,960	1,809,020	1,643,470	1,602,000
Average Value, $ per Barrel	1.95	+ 37.3	1.42	1.22	1.21	1.20	1.19	1.14
Crude Runs to Stills (Total)	**1,849,931**	**+ 6.9**	**1,730,197**	**1,719,534**	**1,665,684**	**1,429,738**	**1,334,103**	**1,409,192**
(Daily Average)	5,068	+ 6.9	4,740	4,711	4,551	3,917	3,655	3,861
Domestic Crude Run	1,752,994	+ 6.5	1,645,845	1,645,862	1,622,514	1,417,559	1,319,507	1,358,246
(Daily Average)	4,803	+ 6.5	4,509	4,509	4,433	3,884	3,615	3,721

Why use Packing?



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See Atlas Section 1948 Composite Catalog, Pages 270-299.

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Export Sales:

be further enlarged rapidly in coming years.

The increase in world production has been phenomenal, the industry having done a remarkable job of boosting output, especially considering the conditions facing it. World crude production reached a daily average of 8,151,526 barrels during 1947, a gain of 8.6 percent or 646,658 barrels above the peak attained in the preceding year. This was 2¾ million barrels, or 50 percent, more per day than were produced in 1938.

With the industry making every effort to make more oil available, additional production gains are a matter of certainty. A gain similar to the one made in 1947 is expected in 1948, which will boost production to more than 8,800,000 barrels per day. By 1951 the industry should be able to make 10 million barrels daily available to consumers, and it appears that all this amount will find a ready market waiting.

The sharp advance attained last year was largely through production records established in the U. S., Venezuela and the Middle East, which upped their output by 1 million barrels daily although the total amount produced by the world was increasing only slightly more than half this amount.

The growth recorded in 1947 was evenly divided between the U. S. and the rest of the world, with each contributing slightly more than 300,000 barrels more than previously produced.

These same countries will contribute most of the enlarged yield expected in the future, and for 1948 the increase again should be about evenly divided between the U. S. and the rest of the world.

The 1947 yield of 5,077,000 barrels daily in the U. S. was 6.9 percent larger than in 1946. This was 1¼ million barrels, or 32 percent, greater than the prewar peak of 1941, and was twice the quantity produced as recently as 1934. Output in 1948 probably will average 5,325,000 barrels per day, and in fact at the beginning of the year had almost attained this level as a result of a sharp growth in the closing months of 1947.

U. S. Becomes Big Importer

Because of the difficulty being experienced in supplying enough petroleum to satisfy domestic requirements, 1948 undoubtedly will mark a significant change in the U. S. foreign oil trade picture. So great is the demand for petroleum, it has become necessary to import peak quantities of oil despite record amounts produced domestically. As a result, the nation's historic position of exporting larger quantities than it imports undoubtedly will be reversed and may never again be witnessed.

Last year exports from the U. S. exceeded the record import volumes by only a small margin, whereas, earlier years have seen export shipments much greater than imports. During 1947, imports averaged 431,900 barrels daily contrasted with a previous peak of 372,500 barrels per day way back in 1922. This represented an increase of 179,700 barrels per day since 1944. Meanwhile, exports were averaging 457,700 barrels.

With additional gains in imports and a reduction in exports expected, the outlook is for the U. S. to become a net importer of oil for the first time since 1922.

Salient Annual Statistics of the United States, Part 2.

ITEM	THOUSANDS OF BARRELS, EXCEPT AS NOTED							
	1947	% Diff. '46-'47	1946	1945	1944	1943	1942	1941
Natural Gasoline Production....	**131,370**	**+ 14.1**	**115,153**	**112,004**	**100,046**	**87,716**	**83,322**	**80,855**
(Daily Average).....	360	+ 14.1	315	307	273	240	228	222
**Natural Gas, Marketed Prod. (Billion Cu. Ft.).....	**4,400**	**+ 8.9**	**4,040**	**3,919**	**3,711**	**3,415**	**3,053**	**2,813**
Value at Wells, ¢ per M cu. ft....	.....	.....	.....	4.9	5.1	5.2	5.1	4.9
Value at Consumption Points....	23.1	+ 5.0	22.0	21.4	21.5	22.3	22.7	22.1
**Imports, (All Oils).....	**157,673**	**+ 16.8**	**135,033**	**113,619**	**92,311**	**63,412**	**35,966**	**97,142**
(Daily Average).....	432	+ 16.8	370	311	252	174	99	266
Crude Petroleum Imports.....	97,032	+ 12.7	86,066	74,337	44,805	13,833	12,297	50,606
(Daily Average).....	266	+ 12.7	236	203	122	38	34	139
Refined Products Imports.....	60,641	+ 23.8	48,967	39,282	47,506	49,579	23,669	46,536
(Daily Average).....	166	+ 23.8	134	108	130	136	65	127
**Stocks End of Year (All Oils)....	**493,150**	**— 2.7**	**507,094**	**463,579**	**477,089**	**485,698**	**497,940**	**552,328**
Refinable Crude Oil Stocks.....	221,319	— 1.4	224,473	218,763	220,862	243,506	234,889	247,499
Heavy California Crude.....	6,021	+ 5.6	5,703	4,496	6,107	8,289	10,865	10,179
Natural Gasoline Stocks.....	3,800	— 23.7	4,981	4,322	4,252	4,541	4,632	4,275
Refined Products Stocks.....	262,010	— 3.7	271,937	235,998	245,868	229,362	247,554	290,375
Motor Fuel Stocks.....	87,619	— 2.1	89,515	93,682	77,874	69,505	75,404	90,688
Kerosine Stocks.....	16,116	— 5.6	17,081	10,421	11,150	9,359	10,064	9,599
Residual Fuel Oil Stocks.....	45,547	— 3.3	47,094	37,158	50,383	48,484	61,783	83,195
Distillate Fuel Oil Stocks.....	50,161	— 15.9	59,620	35,778	38,333	41,728	44,940	49,926
Lubricating Oils Stocks.....	8,300	+ 9.7	7,564	7,773	7,815	7,781	9,424	8,127
**Pipe Line Construction (Miles)..	**7,953**	**+ 85.6**	**4,285**	**3,211**	**4,961**	**7,671**	**7,550**	**7,300**
Oil Lines Completed.....	1,876	+ 16.5	1,610	1,470	2,219	3,795	4,200	2,900
Gas Lines Completed.....	3,479	+173.7	1,271	1,598	2,224	262	1,250	1,700
Product Lines Completed.....	2,598	+ 85.0	1,404	143	518	3,614	2,100	2,700
**Petroleum Reserves, End of Year (Million Barrels).....	**23,067**	**+ 5.2**	**21,924**	**20,827**	**20,453**	**20,064**	**20,083**	**19,589**
**New Petroleum Proved to Exist, (Million Barrels).....	**2,995**	**+ 5.8**	**2,831**	**2,087**	**2,067**	**1,487**	**1,880**	**1,967**

— FOR 38 YEARS

OILBATH SWIVELS

Brewster has four oilbath swivels that cover any drilling depth. Stem sizes available in 3", 4", and 6" in each model; with 50 ton, 120 ton, 220 ton, and 300 ton capacities. Large oil bath reservoir. Maximum strength and service with minimum of weight. Smooth, safe, streamlined body.

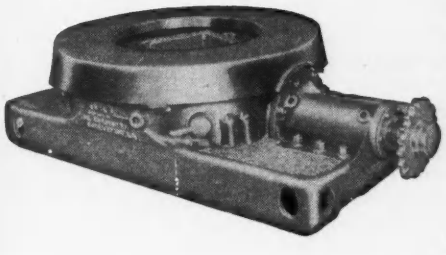
HOOK BLOCKS

Compact and short coupled—ideal for portable rigs or where derrick height is limited. Spring mounted hook swivels on roller thrust bearing. Hook locks in 4 positions. 50 ton and 100 ton capacities.

TRAVELING BLOCKS

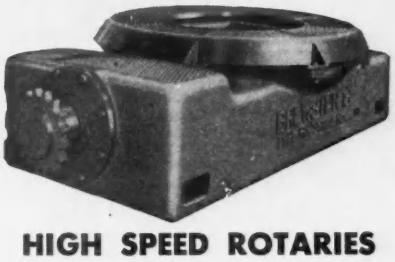
Perfect balance—straight fall. Streamlined to prevent hanging-up. Straight line travel without weave or wobble. Each individual sheave mounted on double-row tapered roller bearings. Six sizes from 90 to 300 ton capacity.

BREWSTER *Matched* EQUIPMENT



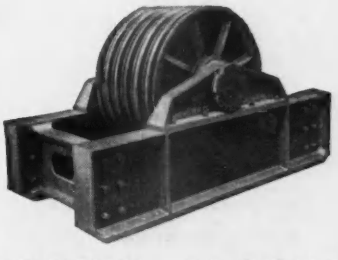
OB ROTARIES

Brewster Model OB Oilbath Rotaries are available in three sizes; 12", 18", and 22", full table opening. Tables are supported by angular-contact ball bearings operating in oil. Alloy steel bed and skid cast integral. Fast, positive table locks.



HIGH SPEED ROTARIES

Heavy Duty High Speed Oilbath Models have 18", 22", and 27½" full table openings. The single piece box-type cast electric alloy steel bed is designed to take the heaviest possible loads. Table turns on angular-contact ball bearings. Spiral bevel gears on 18" model.



CROWN BLOCKS

Brewster Crown Blocks feature rugged and simple construction. Load is distributed evenly along top of beams. Each sheave bearing is individually lubricated. Five sizes ranging from 100 to 300 ton capacities.

BREWSTER *Drilling Equipment*

THE BREWSTER CO., INC.
Manufacturers of Drilling Equipment since 1910
Shreveport, Louisiana, U. S. A.

WRITE FOR FREE CATALOGS

Crude Reserves At Peak

The current petroleum shortage is not due to the exhaustion of the oil supply, since reserves of discovered or proven unproduced oil are continuing to increase in the face of peak production rates.

World reserves stood at nearly 62 billion barrels of crude at the end of 1947, having increased by nearly 3¼ billion barrels although almost 3 million barrels were produced during the year. This means that approximately 6¼ billion barrels were found during the year, which certainly does not indicate that any appreciable difficulties are being encountered in locating new sources.

Even in the U. S., proved petroleum reserves reached an all-time high estimated at 21¾ billion barrels, exclusive of 1 1/3 billion barrels of condensate or distillate. This represented the finding during the year of 844 million more barrels of oil than the record production of 1,853,166,000 barrels. This was the biggest addition to reserves since 1938. Nevertheless, reserves represented a less than normal ratio to production, vividly demonstrating the size of the task which confronts the industry in supplying the huge quantities being used today.

Need To Drill More Wells

The need for larger volumes of crude makes it imperative that the industry drill a larger number of wells annually in order to boost its producing ability, and the existence of the highest crude prices in 25 years provides an incentive for undertaking the greatest drilling program in history. However, an insufficient supply of tubular goods is expected to restrict the number of wells drilled in the U. S. to 34,811 (exclusive of old wells deepened) during 1948. This would represent an increase of 5.5 percent over the 1947 total. If tubular goods are available in excess of the 4 to 5 percent increase predicted, drilling also will increase over the forecast.

The drilling of this number of wells would represent the second largest volume in history, being exceeded only by the 35,210 completed in 1937, but would still represent a subnormal number of completions in relation to current production levels. On the basis that production has increased one-third over prewar years, and greater producing ability is badly needed, it appears that the industry should be drilling about 45,000 per year at present.

Pipe Line Construction Boom

To relieve the petroleum transportation shortage, a precedent-shattering volume of pipe line construction is underway. An all-time peak of 8828 miles of new pipe lines were placed in operation during 1947, of which 7953 miles were in the U. S. This figure should be surpassed in 1948, the outlook indicating 10,000 miles of new line should go into operation this year. Under construction or authorized at the end of the year was 19,704 miles, of which 13,891 miles were in the U. S. A large number of additional lines are under consideration, but difficulties in obtaining equipment will delay the completion of many of these projects beyond 1948. A large number of additional lines are under consideration, and these give assurance the large-scale pipe line construction work is to continue for another four to five years.

Salient Annual Statistics of the United States, Part 3.

ITEM	NUMBER, EXCEPT AS NOTED							
	1947	% Diff. '46-'47	1946	1945	1944	1943	1942	1941
New Fields and Pays Found	**932**	**+ 35.5**	**688**	**647**	**633**	**499**	**523**	**650**
New Oil Discoveries	**717**	**+ 39.8**	**513**	**475**	**475**	**403**	**451**	**562**
New Fields	424	+ 37.7	308	317	326	276	288	301
New Pays	293	+ 42.9	205	158	149	127	163	261
New Gas Discoveries	**117**	**+ 12.5**	**104**	**128**	**117**	**72**	**57**	**83**
New Fields	88	+ 17.3	75	113	102	56	47	58
New Pays	29	.....	29	15	15	16	10	25
New Distillate Discoveries	**98**	**+ 38.0**	**71**	**44**	**41**	**24**	**15**	**5**
New Fields	44	+ 51.7	29	30	32	15	13	3
New Pays	54	+ 28.6	42	14	9	9	2	2
Exploratory Wells Drilled	**5,539**	**+ 12.0**	**4,947**	**4,510**	**4,325**	**3,631**	**3,176**	**3,697**
Productive	1,130	+ 16.5	970	877	805	644	524	650
Non-Productive	4,409	+ 10.9	3,977	3,633	3,520	2,987	2,652	3,047
Well Completions, Total	**33,646**	**+ 9.1**	**30,845**	**27,140**	**26,163**	**20,820**	**22,578**	**33,332**
Oil Wells	17,478	+ 8.6	16,087	13,944	13,502	9,887	10,977	19,590
Gas Wells	3,526	+ 5.1	3,355	3,039	3,024	2,314	2,685	3,279
Distillate Wells	283	+ 36.7	207	153	54	76	105	.....
Dry Holes	9,546	+ 12.4	8,496	7,346	7,153	6,364	5,962	7,280
Gas Input Wells	317	+ 44.7	219	329	218	90	73	117
Water Input Wells	1,799	— 0.9	1,816	1,796	1,784	1,576	2,141	2,197
Water Disposal Wells	46	— 0.8	50	42	51	42	47	47
Old Wells Drilled Deeper	651	+ 5.9	615	491	377	471	588	822
Footage Drilled, Thousands of Feet	**113,212**	**+ 11.5**	**101,493**	**93,159**	**84,592**	**62,212**	**68,146**	**99,705**
Wells Drilling, End of Year	**4,901**	**+ 5.3**	**4,654**	**4,637**	**4,640**	**3,595**	**2,797**	**4,336**
Producing Oil Wells, End of Year	**428,522**	**+ 1.0**	**424,301**	**419,045**	**412,851**	**407,581**	**407,257**	**403,582**
Flowing Oil Wells	49,399	+ 2.1	48,387	48,456	47,191	46,562	47,270	47,749
Pumping Oil Wells	379,123	+ 0.9	375,914	370,589	365,660	361,019	359,987	355,833

Industry to Supply All Essential Petroleum Demand

By L. J. LOGAN
Associate Editor

THE U. S. petroleum industry will again in 1948 put into the hands of consumers record-breaking volumes of petroleum products, after having furnished unprecedented quantities in 1947.

The industry will remain during the coming year in the abnormal position of being unable, because of war-imposed handicaps, to fully meet all potential demand. However, facilities for supplying more petroleum products are being expanded as rapidly as the scarcities of steel and other materials permit. Consequently, the industry may be expected to supply satisfactorily all essential requirements of the nation during the year and make appreciable progress toward regaining the normal ability to meet all needs in full. As in 1947, scarcities of petroleum products should be held down by the industry to localized and temporary situations.

In the efforts to keep abreast of the very strong postwar demand for petroleum products, the industry is relying mainly on its vigorous and costly expansion program to make greater supply available. However, it has been necessary in recent months and will continue necessary for the consumers to help balance supply and demand by eliminating wasteful and unnecessary use. There are important possibilities for curtailing the consumption of petroleum products, especially heating oils and gasoline, without discomfort or inconvenience to the people and with monetary savings to them. Of this fact the public has been advised and repeatedly reminded by the oil companies, through advertising and personal contact, and this publicity should contribute materially toward the satisfactory solution of oil scarcities in 1948.

Price Conservation

The prevailing prices of petroleum products, following substantial increases since the middle of 1946, also promise to act as an appreciable influence in 1948 in causing conservative use of oils and the elimination of wasteful and unnecessary use. Thus the prevailing prices should perceptibly help to provide a balance between demand and supply.

Still another means by which the tightness of supply of petroleum products for the nation's consumers is being relieved currently is that of curtailing exports. Under the auspices of the federal government, restrictions upon export shipments of oils are currently in effect, and to some extent these restrictions will help to assure adequate supplies for essential domestic requirements.

As in the case of most other widely used commodities made scarce worldwide by the war, petroleum products are in tight supply on a worldwide basis, and the world scarcity within itself has made a tightness of supply in the U. S. virtually inevitable. Even if the U. S. had a surplus of petroleum products above its domestic requirements, such would be in strong demand abroad and would be absorbed, leaving as now a relatively tight U. S. supply situation. Only when the worldwide as well as the U. S. domestic demand is satisfied can there be a restoration of a free supply situation for American consumers. This fact tends to support the contention of internationally operating Ameri-

Forecast of Petroleum Demand and Supply, 1948 Compared with Other Years

Data for 1948 estimated by WORLD OIL, with aid of forecasts by Bureau of Mines and private company economists. Prior years from Bureau of Mines except November and December, 1947, estimated with aid of A.P.I. statistical bulletins.

THOUSANDS OF BARRELS DAILY

ITEM	1941	1946	1947	% Diff. '46-'47	Forecast 1948	% Diff. '47-'48
DEMAND						
Total Demand, All Oils	4,369	5,321	5,909	+11.0	6,133	+ 3.8
Domestic	4,071	4,907	5,451	+11.1	5,726	+ 5.0
Export	298	414	458	+10.5	407	—11.1
Motor Fuel, Total	1,903	2,137	2,304	+ 7.8	2,406	+ 4.4
Domestic	1,829	2,013	2,176	+ 8.1	2,308	+ 6.1
Export	74	124	128	+ 3.0	98	—23.4
Kerosine, Total	199	268	305	+14.1	323	+ 5.9
Domestic	190	244	284	+16.1	301	+ 6.0
Export	9	24	21	— 7.4	22	+ 4.8
Distillate Fuel Oil	520	746	896	+20.1	950	+ 6.0
Domestic	474	666	806	+21.1	901	+11.8
Export	46	80	90	+11.8	49	—45.6
Residual Fuel Oil	1,089	1,333	1,450	+ 8.8	1,452	+ 0.1
Domestic	1,050	1,307	1,420	+ 8.6	1,419	— 0.1
Export	39	26	30	+17.2	33	+10.0
Lubricants	110	126	139	+10.2	145	+ 4.3
Domestic	83	96	100	+ 4.7	105	+ 5.0
Export	27	30	39	+27.3	40	+ 2.6
Other Products & Ref. Losses	419	557	618	+10.9	655	+ 6.0
Domestic	407	539	594	+10.2	627	+ 5.6
Export	12	18	24	+33.3	28	+16.7
Crude (as fuel, losses, exports)	129	154	197	+27.9	202	+ 2.5
Domestic	38	42	71	+69.0	65	— 8.5
Export	91	112	126	+12.5	137	+ 8.7
Change in Stocks, All Oils	—30	+119	—38	.....	+27	.....
Crude Oil	—52	+ 19	— 8	.....	.....	.....
Natural Gasoline	— 4	+ 2	— 3	.....	.....	.....
Refined Products	+26	+ 98	—27	.....	+27	.....
NEW SUPPLY						
Total New Supply	4,339	5,440	5,871	+ 7.9	6,160	+ 4.9
Domestic Production, Total	4,073	5,070	5,439	+ 7.3	5,705	+ 4.9
Crude Oil	3,842	4,749	5,077	+ 6.9	5,325	+ 4.9
Natural Gasoline & Benzol	231	321	362	+12.8	380	+ 5.0
Imports, Total	266	370	432	+16.7	455	+ 5.3
Crude Oil (specialties & heavy)	139	236	266	+12.7	275	+ 3.4
Refined Products (mostly residual fuel and marine diesel)	127	134	166	+23.9	180	+ 8.4
Crude Oil Run to Stills	3,861	4,740	5,068	+ 6.9	5,300	+ 4.6

can oil companies that expansion in the Middle East, Venezuela, and other important foreign sources of petroleum is necessary not only for supplying European and other foreign demand but also for improving the supply situation for the U. S.

Slowly but surely, the current foreign expansion and the vigorous domestic improvement and enlargement of facilities are working toward providing increased supplies of oils.

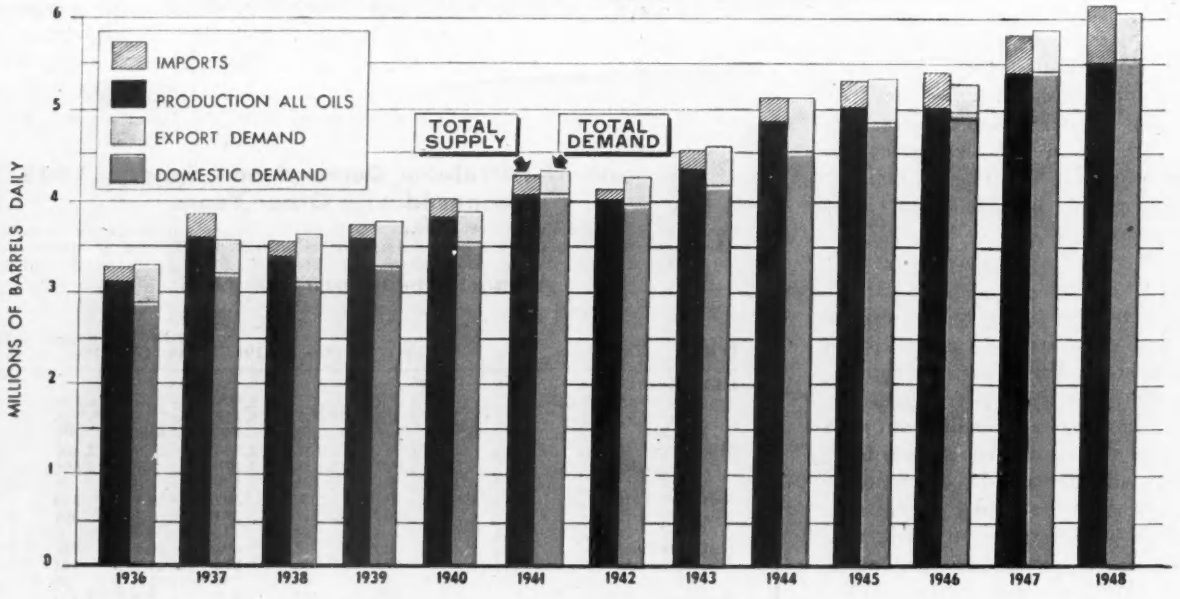
For the U. S., the domestic consumption of all oils in 1948 can be about 5 percent greater than in 1947, it is currently indicated, by considering the presently available facilities for supplying requirements and by also taking into consideration the prospective expansion of refining and other facilities during the year. This estimate of a 5 percent increase in domestic consumption possibilities assumes, however, some reduction of exports from former rates, with 1948 total exports of crude oil and refined products estimated about 11 percent lower than in 1947. These estimates are based upon the prospects of being able to supply a total domestic and export demand for all oils in the aggregate amount of 6,133,000 barrels daily in 1948, while at the same time achieving some necessary buildup of working stocks of petroleum products, averaging 27,000 barrels daily for the year. This indicated total demand of 6,133,000 barrels daily in 1948 would be the first year of demand exceeding 6 million barrels per day and would be 224,000 barrels a day or 3.8 percent more than the total demand of 5,909,000 barrels daily in 1947, which broke all previous annual records.

The estimate of 6,133,000 barrels per day of U. S. domestic and export demand for all oils in 1948 represents actually an estimate of the supply that will be available for meeting demand rather than the customary estimate of the potential demand itself. This is an unusual way of projecting oil industry operations in peacetime. However, even at the beginning of 1947 it was foreseen that supply might be a limiting factor on consumption of residual fuel oil during that year, and by the middle of 1947, it had become evident that supply of gasoline and distillate fuel oil could not quite equal the potential demand in the latter half of 1947. Allocation of quotas of gasoline to dealers became necessary in the Middle West, and subsequently it was necessary for refiners to establish allocations of supplies of gasoline and fuel oils to dealers along the Atlantic Coast. Although the U. S. industry supplied 11 percent more oils to domestic and foreign customers in 1947 than in 1946, an abnormally large increase, there was still some potential demand that could not be supplied under the handicaps that the industry experienced in attempting to expand its facilities for turning out more oils.

Less Exports Percentagewise

Out of the indicated 6,133,000 barrels per day of supply available for market-

United States Petroleum Supply And Demand



Figures in Thousands of Barrels Daily

Thousands of Barrels Daily

YEAR	SUPPLY			DEMAND			Change In All Stocks[5]
	Production All Oils[1]	Total Imports[2]	Total New Supply	Domestic Demand[3]	Exports & Shipments[4]	Total Demand	
1936	3,128	156	3,284	2,986	360	3,346	— 62
1937	3,647	157	3,804	3,205	473	3,678	+126
1938	3,472	149	3,621	3,115	531	3,646	— 25
1939	3,614	162	3,776	3,373	518	3,891	—115
1940	3,858	229	4,087	3,625	356	3,981	+106
1941	4,073	266	4,339	4,071	298	4,369	— 30
1942	4,034	99	4,133	3,972	321	4,293	—160
1943	4,372	174	4,546	4,168	411	4,579	— 33
1944	4,864	252	5,116	4,562	571	5,133	— 17
1945	5,010	311	5,321	4,857	501	5,358	— 37
1946	5,070	370	5,440	4,907	414	5,321	+119
1947	5,439	432	5,871	5,451	458	5,909	— 38
1948 (Forecast)	5,705	455	6,160	5,726	407	6,133	+ 27

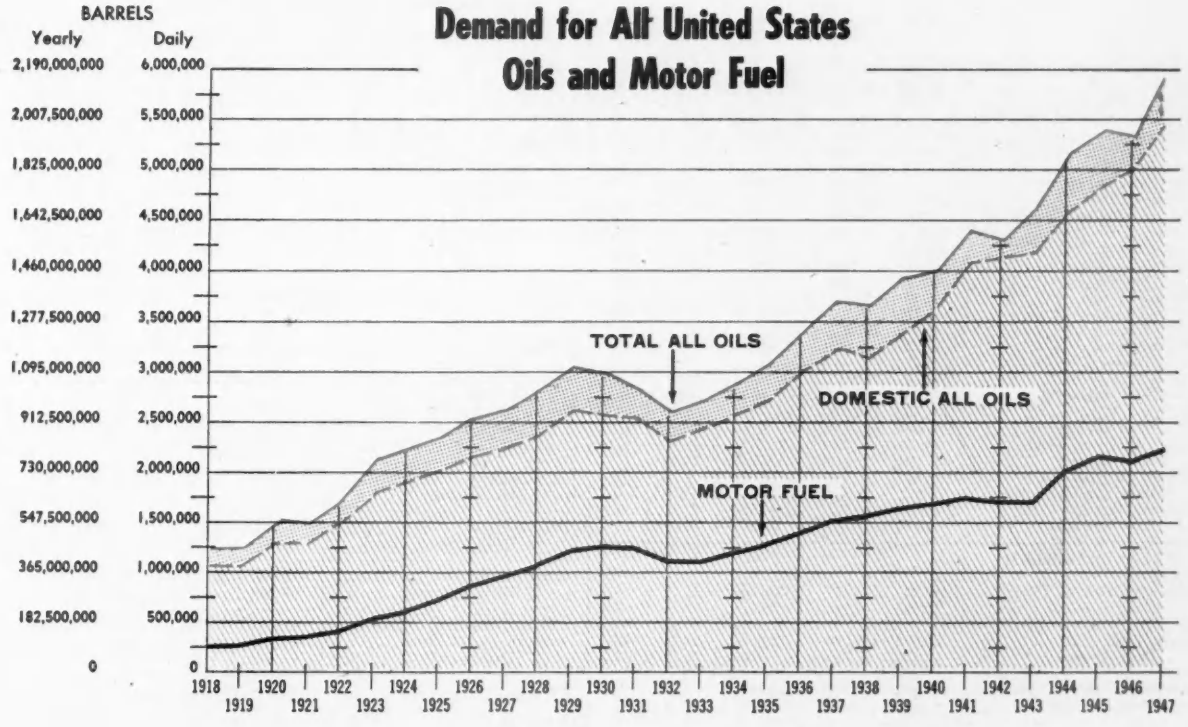
[1] Includes crude oil, natural gasoline, related products and benzol. [2] Includes both refined and crude oils. [3] Includes military and civilian demand in continental United States and shipments to U.S. armed forces abroad. [4] Includes shipments to non-contiguous territories. [5] Includes changes in both refined and crude oil stocks. Minus signs indicate decreases and plus signs increases.

Data from Bureau of Mines, except November and December, 1947, estimated by WORLD OIL.

ing in 1948, it is estimated that about 407,000 barrels per day will be exported, including 137,000 daily of crude oil and 270,000 daily of refined products. These total exports of 407,000 barrels daily in 1948 would be about 51,000 daily or 11 percent less than the indicated exports of 458,000 barrels daily in 1947. In view of very recent developments in the curtailment of exports, it is now quite possible that the above estimate of 1948 exports may have to be reduced, even though it allows for a substantial decrease from the 1947 rates of shipments. If the exports are lower than above estimated, then some increase in volumes available for domestic consumption will be possible.

On the basis of exports of 407,000 barrels daily, and an available marketable supply of 6,133,000 daily, the effective domestic demand for all oils would be 5,726,000 barrels per day. This amount would be 275,000 barrels per day or 5 percent more than the indicated domestic demand of 5,451,000 daily for all oils in 1947.

The above estimates of demand (or more accurately, available supply) are held down to these levels, in the face of higher potential sales, because of the limitations on available supplies of oils that can be turned out by domestic



Demand for All Oils — Demand for Motor Fuel

(All Figures in Barrels)

YEAR	TOTAL (Domestic and Export)		DOMESTIC		EXPORTS		TOTAL (Domestic and Export)		DOMESTIC		EXPORTS	
	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average
1918.....	.....	.....	.....	.....	.....	.....	93,599,000	256,400	79,949,000	219,000	13,650,000	37,000
1919.....	438,434,000	1,201,200	374,541,000	1,026,100	63,893,000	175,100	97,790,000	267,900	88,648,000	242,900	9,142,000	25,000
1920.....	535,382,000	1,462,800	456,764,000	1,245,300	79,618,000	217,500	124,623,000	340,500	108,945,000	297,700	15,678,000	42,800
1921.....	592,402,000	1,450,400	457,521,000	1,253,300	71,881,000	196,900	130,203,000	356,700	116,840,000	320,100	13,363,000	36,600
1922.....	605,540,000	1,659,000	530,990,000	1,454,800	74,550,000	204,200	152,132,000	416,800	137,770,000	377,500	14,362,000	39,300
1923.....	754,361,000	2,066,700	652,027,000	1,786,400	102,334,000	280,300	195,556,000	535,800	174,462,000	478,000	21,094,000	57,800
1924.....	805,070,000	2,199,600	687,742,000	1,879,100	117,328,000	320,500	225,737,000	616,800	196,586,000	537,100	29,151,000	79,700
1925.....	840,818,000	2,303,600	726,797,000	1,991,200	114,021,000	312,400	264,429,000	724,500	232,745,000	637,700	31,684,000	86,800
1926.....	912,893,000	2,501,100	780,487,000	2,138,300	132,406,000	362,800	311,897,000	854,500	268,128,000	734,600	43,769,000	119,900
1927.....	944,762,000	2,588,400	802,499,000	2,198,600	142,263,000	389,800	350,318,000	959,800	305,367,000	836,600	44,951,000	123,200
1928.....	1,014,716,000	2,772,400	859,759,000	2,349,000	154,957,000	423,400	392,293,000	1,071,800	338,881,000	925,900	53,412,000	145,900
1929.....	1,103,203,000	3,022,500	940,083,000	2,575,600	163,120,000	446,900	444,937,000	1,219,000	382,878,000	1,049,000	62,059,000	170,000
1930.....	1,083,511,000	2,968,500	927,016,000	2,539,800	156,495,000	428,700	463,184,000	1,269,000	397,609,000	1,089,300	65,575,000	179,700
1931.....	1,027,274,000	2,814,500	902,920,000	2,473,800	124,354,000	340,700	453,559,000	1,242,600	407,843,000	1,117,400	45,716,000	125,200
1932.....	938,757,000	2,564,900	835,482,000	2,282,700	103,275,000	282,200	413,229,000	1,129,000	377,791,000	1,032,200	35,438,000	96,800
1933.....	975,214,000	2,671,800	868,487,000	2,379,400	106,727,000	292,400	409,815,000	1,122,800	380,494,000	1,042,500	29,321,000	80,300
1934.....	1,034,672,000	2,834,700	920,165,000	2,521,000	114,507,000	313,700	435,025,000	1,191,800	410,339,000	1,124,200	24,686,000	67,600
1935.....	1,112,672,000	3,048,400	983,685,000	2,695,000	128,987,000	353,400	465,423,000	1,275,100	434,810,000	1,191,200	30,613,000	83,900
1936.....	1,224,748,000	3,346,300	1,092,754,000	2,985,700	131,994,000	360,600	510,252,000	1,394,100	481,606,000	1,315,800	28,646,000	78,300
1937.....	1,342,516,000	3,678,100	1,169,682,000	3,204,600	172,834,000	473,500	557,658,000	1,527,800	519,352,000	1,422,900	38,306,000	104,900
1938.....	1,330,850,000	3,646,200	1,137,122,000	3,115,400	193,728,000	530,800	573,112,000	1,570,200	523,003,000	1,432,900	50,109,000	137,300
1939.....	1,420,035,000	3,890,500	1,231,067,000	3,372,800	188,959,000	517,700	600,147,000	1,644,200	555,509,000	1,521,900	44,638,000	122,300
1940.....	1,457,086,000	3,981,100	1,326,620,000	3,624,600	130,466,000	356,500	614,867,000	1,679,900	589,490,000	1,610,600	25,377,000	69,300
1941.....	1,594,609,000	4,368,800	1,485,779,000	4,070,600	108,830,000	298,200	694,588,000	1,903,000	667,505,000	1,828,800	27,083,000	74,200
1942.....	1,566,815,000	4,292,600	1,449,908,000	3,972,300	116,907,000	320,300	624,207,000	1,710,200	589,110,000	1,614,000	35,097,000	96,200
1943.....	1,671,383,000	4,579,100	1,521,426,000	4,168,300	149,957,000	410,800	619,815,000	1,698,100	568,238,000	1,556,800	51,577,000	141,300
1944.....	1,878,879,000	5,133,600	1,671,263,000	4,566,300	207,616,000	567,300	733,019,000	2,002,800	632,482,000	1,728,100	100,537,000	274,700
1945.....	1,955,668,000	5,358,000	1,772,685,000	4,856,700	182,983,000	501,300	784,392,000	2,149,000	696,333,000	1,907,800	88,059,000	241,200
1946.....	1,942,165,000	5,231,000	1,790,961,000	4,906,700	151,204,000	414,300	780,222,000	2,137,600	734,833,000	2,013,200	45,389,000	124,400
1947.....	2,156,843,000	5,909,200	1,989,786,000	5,451,500	167,057,000	457,700	840,856,000	2,303,700	794,115,000	2,175,600	46,741,000	128,100

Source: U. S. Bureau of Mines except for latest year which has been estimated by WORLD OIL with aid of Bureau statistics for 10 months.

Demand for and Supply of All Oils, Crude Oil, Motor Fuel, Kerosine, Fuel Oils, and Lubricants

(Source: U. S. Bureau of Mines except November and December 1947, estimated with aid of A.P.I. Statistical Bulletins)

(THOUSANDS OF BARRELS)

ITEM	Year 1941	Year 1946	Year 1947	% Diff. '41-'47	% Diff. '46-'47
ALL OILS					
Domestic Production, Total	1,486,518	1,850,647	1,985,226	+ 33.5	+ 7.3
(Daily Average)	4,073	5,070	5,439	+ 33.5	+ 7.3
Crude Petroleum	1,402,228	1,733,424	1,853,166	+ 32.2	+ 6.9
(Daily Average)	3,842	4,749	5,077	+ 32.2	+ 6.9
Natural Gasoline	80,855	115,153	131,370	+ 62.4	+ 14.1
(Daily Average)	222	315	360	+ 62.4	+ 14.1
Benzol	3,435	2,070	690	— 79.9	— 66.7
(Daily Average)	9	6	2	— 79.9	— 66.7
Imports, Total	97,142	135,033	157,673	+ 62.3	+ 16.8
(Daily Average)	266	370	432	+ 62.3	+ 16.8
Crude Petroleum	50,606	86,066	97,032	+ 91.7	+ 12.7
(Daily Average)	139	236	266	+ 91.7	+ 12.7
Refined Products	46,536	48,967	60,641	+ 30.3	+ 23.8
(Daily Average)	127	134	166	+ 30.3	+ 23.8
Changes in Stocks, All Oils	—10,949	+43,515	—13,944	.....	.....
(Daily Average)	—30	+119	—38	.....	.....
Stocks, Beginning of Period	563,277	463,579	507,094	— 10.0	+ 9.4
Refinable Crude	264,709	218,763	224,473	— 15.2	+ 2.6
Heavy Crude in California	11,906	4,496	5,703	— 52.1	+ 26.8
Refined Products	280,958	235,998	271,937	— 3.2	+ 15.2
Natural Gasoline	5,704	4,322	4,981	— 12.7	+ 15.2
Stocks, End of Period	552,328	507,094	493,150	— 10.7	— 2.7
(Days' Supply)	127	95	83	— 34.6	— 12.6
Refinable Crude	247,499	224,473	221,319	— 10.6	— 1.4
Heavy Crude in California	10,179	5,703	6,021	— 40.8	+ 5.6
Refined Products	290,375	271,937	262,010	— 10.8	— 3.7
Natural Gasoline	4,275	4,981	3,800	— 11.1	— 23.7
Demand, Total	1,594,609	1,942,165	2,156,843	+ 35.2	+ 11.0
(Daily Average)	4,369	5,321	5,909	+ 35.2	+ 11.0
Exports, Total	108,830	151,204	167,057	+ 53.5	+ 10.5
(Daily Average)	298	414	458	+ 53.5	+ 10.5
Crude Petroleum, Total	33,238	40,750	46,034	+ 38.5	+ 13.0
(Daily Average)	91	112	126	+ 38.5	+ 13.0
Refined Products, Total	75,592	110,454	121,023	+ 60.1	+ 9.6
(Daily Average)	207	302	332	+ 60.1	+ 9.6
Domestic Demand, Total	1,485,779	1,790,961	1,989,786	+ 33.9	+ 11.1
(Daily Average)	4,071	4,907	5,451	+ 33.9	+ 11.1
CRUDE PETROLEUM					
Supply:					
Domestic Production, Total	1,402,228	1,733,424	1,853,166	+ 32.2	+ 6.9
(Daily Average)	3,842	4,749	5,077	+ 32.2	+ 6.9
Imports, Total	50,606	86,066	97,032	+ 91.7	+ 12.7
(Daily Average)	139	236	266	+ 91.7	+ 12.7
Change in Stocks (incl. Calif. hvy.)	—18,937	+6,917	—2,836	.....	.....
(Daily Average)	—52	+19	—8	.....	.....
Stocks, Beginning of Period	276,615	223,259	230,176	— 16.8	+ 3.1
Stocks, End of Period	257,678	230,176	227,340	— 11.8	— 0.1
(Days' Supply)	69	46	42	— 39.1	— 8.7
Supply, Total	1,471,771	1,812,573	1,953,034	+ 32.7	+ 7.7
(Daily Average)	4,032	4,966	5,351	+ 32.7	+ 7.7
Demand:					
Runs to Stills, Total	1,409,192	1,730,197	1,849,931	+ 31.3	+ 6.9
(Daily Average)	3,861	4,740	5,068	+ 31.3	+ 6.9
Domestic Crude	1,358,246	1,645,845	1,752,994	+ 29.1	+ 6.5
(Daily Average)	3,721	4,509	4,803	+ 29.1	+ 6.5
Foreign Crude	50,946	84,352	96,937	+ 90.3	+ 14.9
(Daily Average)	140	231	265	+ 90.3	+ 14.9
Exports, Total	33,238	40,750	46,034	+ 38.5	+ 13.0
(Daily Average)	91	112	126	+ 38.5	+ 13.0
Transfers to Fuel Oil Stocks	15,482	26,265	31,262	+101.9	+ 19.0
(Daily Average)	42	72	86	+101.9	+ 19.0
Distillate Fuel Oil	2,513	3,123	3,310	+ 31.7	+ 6.0
Residual Fuel Oil	12,969	23,142	27,952	+115.5	+ 20.8
Used as Fuel, and Losses	13,859	15,361	25,807	+ 86.2	+ 68.0
(Daily Average)	38	42	71	+ 86.2	+ 68.0
Demand, Total	1,471,771	1,812,573	1,953,034	+ 32.7	+ 7.7
(Daily Average)	4,032	4,966	5,351	+ 32.7	+ 7.7
KEROSINE					
Production, Total	72,586	104,385	110,502	+ 52.2	+ 5.9
(Daily Average)	199	286	303	+ 52.2	+ 5.9
Percent Yield from Crude	5.1	6.0	6.0	.....	.....
Imports, Total	191	.....	.....	.....	.....
(Daily Average)	1	.....	.....	.....	.....
Change in Stocks	+87	+6,660	—965	.....	.....
(Daily Average)	.....	+18	—2	.....	.....
Stocks, Beginning of Period	9,512	10,421	17,081	+ 79.6	+ 63.9
Stocks, End of Period	9,599	17,081	16,116	+ 67.9	— 5.6
(Days' Supply)	48	64	53	+ 10.4	— 1.7
Demand, Total	72,690	97,725	111,467	+ 53.3	+ 14.1
(Daily Average)	199	268	305	+ 53.3	+ 14.1
Exports, Total	3,221	8,559	7,929	+146.2	— 7.4
(Daily Average)	9	23	21	+146.2	— 7.4
Domestic Demand	69,469	89,166	103,538	+ 49.0	+ 16.1
(Daily Average)	190	244	284	+ 49.0	+ 16.1

ITEM	Year 1941	Year 1946	Year 1947	% Diff. '41-'47	% Diff. '46-'47
MOTOR FUEL					
Production, Total	701,294	776,054	838,742	+ 19.6	+ 8.1
(Daily Average)	1,921	2,126	2,298	+ 19.6	+ 8.1
Refinery Gasoline, Total	623,285	685,550	742,671	+ 19.2	+ 8.3
(Daily Average)	1,708	1,878	2,035	+ 19.2	+ 8.3
Percent Yield from Crude	44.2	39.6	40.1	.....	.....
Natural Gasoline, etc.	80,855	115,153	131,370	+ 62.4	+ 14.1
(Daily Average)	222	315	360	+ 62.4	+ 14.1
Less Sales of L.P.G.	6,281	25,458	34,646	+451.6	+ 36.1
Less Transfers Cycle Prods	.....	1,261	1,747	.....	+ 38.5
Benzol	3,435	2,070	690	397.8	— 66.7
Imports, Total	335	1	218	— 35.0	+
(Daily Average)	1	.....	1	— 35.0	+
Change in Stocks	+7,041	—4,167	—1,896	.....	.....
(Daily Average)	+19	—11	—5	.....	.....
Stocks, Beginning of Period	83,647	93,682	89,515	+ 7.0	— 4.4
Finished Gasoline	77,943	89,360	84,534	+ 8.5	— 5.4
Natural Gasoline	5,704	4,322	4,981	— 12.7	+ 15.2
Stocks, End of Period	90,688	89,515	87,619	— 3.4	— 2.1
(Days' Supply)	48	42	38	— 20.8	— 9.5
Finished Gasoline	86,413	84,534	83,819	— 3.0	— 0.8
Natural Gasoline	4,275	4,981	3,800	— 11.1	— 23.7
Demand, Total	694,588	780,222	840,856	+ 21.1	+ 7.8
(Daily Average)	1,903	2,137	2,304	+ 21.1	+ 7.8
Exports, Total	27,083	45,389	46,741	+ 72.6	+ 3.0
(Daily Average)	74	124	128	+ 72.6	+ 3.0
Domestic Demand	667,505	134,833	794,115	+ 18.2	+ 8.1
(Daily Average)	1,829	2,013	2,176	+ 18.2	+ 8.1
DISTILLATE FUEL OIL					
Production, Total	189,177	287,896	309,927	+ 63.8	+ 7.7
(Daily Average)	518	789	849	+ 63.8	+ 7.7
Percent Yield from Crude	13.4	16.6	16.7	.....	.....
Transfers from Crude	2,513	3,123	3,310	+ 31.7	+ 6.0
(Daily Average)	7	8	9	+ 31.7	+ 6.0
Imports, Total	5,074	5,141	4,289	— 15.5	— 16.6
(Daily Average)	14	14	12	— 15.5	— 16.6
Change in Stocks	+7,015	+23,842	—9,459	.....	.....
(Daily Average)	+19	+65	—26	.....	.....
Stocks, Beginning of Period	42,911	35,778	59,620	+ 38.9	+ 66.6
Stocks, End of Period	49,926	59,620	50,161	+ 0.5	— 15.9
(Days' Supply)	96	80	56	— 41.7	— 42.8
Demand, Total	189,749	272,318	326,985	+ 72.3	+ 20.1
(Daily Average)	520	746	896	+ 72.3	+ 20.1
Exports, Total	16,925	29,353	32,812	+ 92.9	+ 11.8
(Daily Average)	46	80	90	+ 92.9	+ 11.8
Domestic Demand	172,824	242,965	294,173	+ 70.2	+ 21.1
(Daily Average)	474	666	806	+ 70.2	+ 21.1
RESIDUAL FUEL OIL					
Production, Total	342,367	431,364	447,243	+ 30.6	+ 3.7
(Daily Average)	938	1,182	1,225	+ 30.6	+ 3.7
Percent Yield from Crude	24.2	24.9	24.2	.....	.....
Transfers from Crude	12,969	23,142	27,952	+115.5	+ 20.8
(Daily Average)	36	63	77	+115.5	+ 20.8
Imports, Total	37,369	42,067	52,658	+ 40.9	+ 25.
(Daily Average)	102	115	144	+ 40.9	+ 25.
Change in Stocks	—4,831	+9,936	—1,547	.....	.....
(Daily Average)	—13	+27	—4	.....	.....
Stocks, Beginning of Period	88,026	37,158	47,094	— 46.5	+ 26.7
Stocks, End of Period	83,195	47,094	45,547	— 45.3	— 3.3
(Days' Supply)	76	35	31	— 59.2	— 11.4
Demand, Total	397,536	486,637	529,400	+ 33.2	+ 8.8
(Daily Average)	1,089	1,333	1,450	+ 33.2	+ 8.8
Exports, Total	14,114	9,486	11,116	— 21.2	+ 17.2
(Daily Average)	39	26	30	— 21.2	+ 17.2
Domestic Demand	383,422	477,151	518,284	+ 35.2	+ 8.6
(Daily Average)	1,050	1,307	1,420	+ 35.2	+ 8.6
LUBRICATING OIL					
Production, Total	39,539	45,645	51,320	+ 29.8	+ 12.4
(Daily Average)	108	125	141	+ 29.8	+ 12.4
Percent Yield from Crude	2.8	2.6	2.8	.....	.....
Imports, Total	.....	88	38	.....	— 56.8
(Daily Average)	.....	.....	.....	.....	.....
Change in Stocks	—640	—209	+736	.....	.....
(Daily Average)	—2	—1	+2	.....	.....
Stocks, Beginning of Period	8,767	7,773	7,564	— 13.7	— 2.7
Stocks, End of Period	8,127	7,564	8,300	+ 2.1	+ 9.7
(Days' Supply)	74	60	60	— 18.9	.....
Demand, Total	40,179	45,942	50,622	+ 26.0	+ 10.2
(Daily Average)	110	126	139	+ 26.0	+ 10.2
Exports, Total	9,924	11,058	14,079	+ 41.9	+ 27.3
(Daily Average)	27	30	39	+ 41.9	+ 27.3
Domestic Demand	30,255	34,884	36,543	+ 20.8	+ 4.7
(Daily Average)	83	96	100	+ 20.8	+ 4.7

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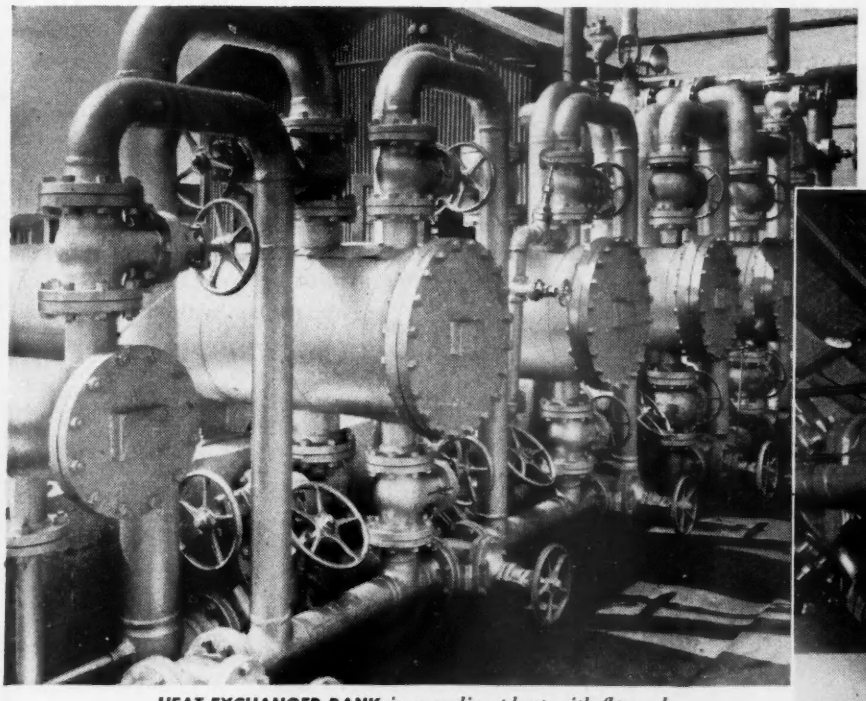

HEAT EXCHANGER BANK *in recycling plant with flanged, screwed, and welding piping materials from the complete Crane line. Standard 125 and 250-pound iron body wedge gates are used.*

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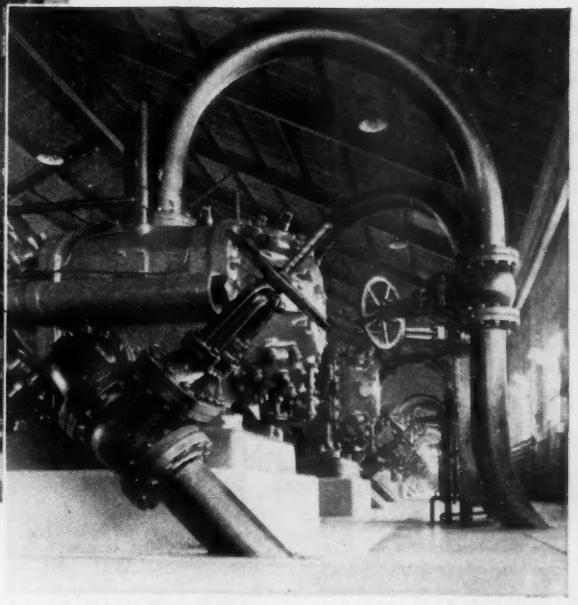

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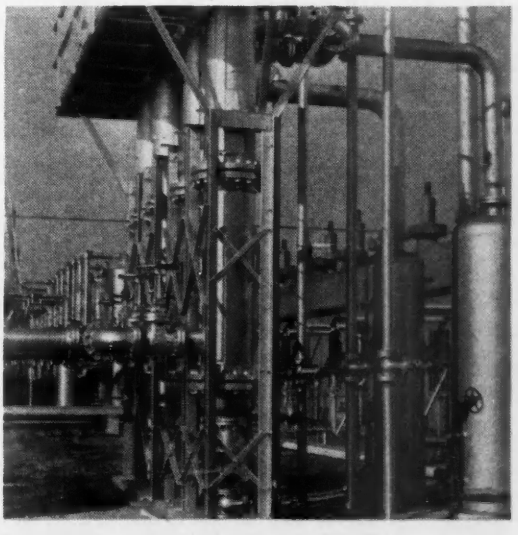

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refineries and brought in from foreign sources. It is indicated that neither domestic supply nor imports can be stepped up more than about 5 percent over the high rates of 1947, because of the limints on U. S. refining capacity, the scarcity of the foreign oils needed, and the continuing shortage of tankers.

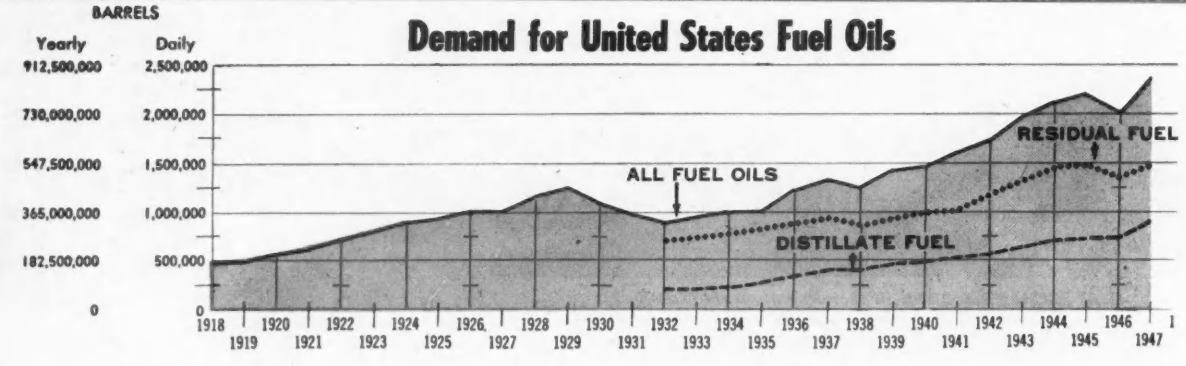
Total imports are here estimated at 455,000 barrels daily in 1948, an increase of 23,000 barrels daily or 5.3 percent over the partly estimated imports of 432,000 barrels daily in 1947. Some increases in imports of both crude oil and fuel oils are expected. Although indicating only a moderate increase for the year, imports of 455,000 barrels daily would be considerably higher than in former years and would exceed the herewith estimated exports of 407,000 barrels daily by a considerable margin. Fulfillment of these estimates of imports and exports would make the U. S. a net importer of petroleum for a full calendar year, whereas in 1947 and traditionally before that the country has been a net exporter. There were some months in 1947 when imports exceeded exports, but for the year as a whole, exports averaged approximately 458,000 barrels daily and imports about 432,000 daily. Thus the nation remained in 1947 a net exporter by 26,000 barrels daily. U. S. imports are predominantly crude oil and residual fuel oil, and its exports are predominantly refined products, and a continuance of this nature of U. S. foreign trade in petroleum is indicated.

After figuring in the probable available imports and allowing for some increase in U. S. natural gasoline production, a projection of the industry's operations through 1948 narrows down largely to estimating the possible volumes of throughput of crude oil at U. S. refineries, which have been forced to operate at abnormally high rates. Taking into account the scheduled completion of some new refinery capacity in 1948, with several new units to go on stream at different stages of the year, it is indicated that the weighted average of rated capacity of U. S. refineries in 1948 will be approximately 5,714,000 barrels per day, with the capacity increasing in several rises from about 5,671,000 daily at the beginning of the year to about 5,750,000 daily in the latter part of the year.

The estimate herewith that actual re-

■ CONTINUED ON PAGE 81

Demand for United States Fuel Oils



All Figures in Barrels

YEAR	TOTAL DEMAND (Domestic and Export) Annual Total	TOTAL DEMAND (Domestic and Export) Daily Average	DOMESTIC DEMAND Annual Total	DOMESTIC DEMAND Daily Average	EXPORTS Annual Total	EXPORTS Daily Average
* All Fuel Oils (Distillate & Residual)						
1918	172,387,000	472,300	142,751,000	391,100	29,636,000	81,200
1919	180,290,000	494,000	163,803,000	448,800	16,487,000	45,200
1920	208,052,000	568,400	185,972,000	508,100	22,080,000	60,300
1921	218,322,000	598,100	195,656,000	536,000	22,676,000	62,100
1922	255,542,000	700,100	237,063,000	649,500	18,479,000	50,600
1923	294,760,000	807,500	261,388,000	716,100	33,372,000	91,400
1924	328,015,000	896,200	290,766,000	794,400	37,249,000	101,800
1925	343,092,000	940,000	307,004,000	841,100	36,088,000	98,900
1926	377,923,000	1,035,400	339,572,000	930,300	38,351,000	105,100
1927	386,656,000	1,059,300	339,265,000	929,500	47,391,000	129,800
1928	428,401,000	1,170,500	383,974,000	1,049,100	44,427,000	121,400
1929	454,307,000	1,244,700	415,156,000	1,137,400	39,151,000	107,300
1930	404,981,000	1,109,600	368,531,000	1,009,700	36,450,000	99,900
1931	363,899,000	997,000	334,668,000	916,900	29,231,000	80,100
1932	324,151,000	885,600	304,157,000	831,000	19,994,000	54,600
1933	344,268,000	943,200	323,705,000	886,900	20,563,000	56,300
1934	368,976,000	1,010,900	340,371,000	932,500	28,605,000	78,400
1935	395,671,000	1,084,000	366,723,000	1,004,700	28,948,000	79,300
1936	445,524,000	1,217,300	410,641,000	1,122,000	34,883,000	95,300
1937	487,788,000	1,336,400	442,355,000	1,211,900	45,433,000	124,500
1938	456,843,000	1,251,600	409,282,000	1,121,300	47,561,000	130,300
1939	507,966,000	1,391,700	458,461,000	1,256,100	49,505,000	135,600
1940	536,263,000	1,465,200	501,014,000	1,368,900	35,249,000	96,300
1941	587,285,000	1,609,000	556,246,000	1,524,000	31,039,000	85,000
1942	625,028,000	1,712,400	591,358,000	1,620,200	33,670,000	92,200
1943	714,969,000	1,958,800	675,118,000	1,849,600	39,851,000	109,200
1944	777,367,000	2,124,000	721,340,000	1,970,900	56,027,000	153,100
1945	794,672,000	2,177,200	749,507,000	2,053,500	45,165,000	123,700
1946	758,955,000	2,079,300	720,116,000	1,972,900	38,839,000	106,400
1947	856,385,000	2,346,200	812,457,000	2,225,900	43,928,000	120,300

* Breakdown of fuel oils by distillates and residual grades not available prior to 1932; but breakdown for 1932 and subsequent years appears at right.

YEAR	TOTAL DEMAND (Domestic and Export) Annual Total	TOTAL DEMAND (Domestic and Export) Daily Average	DOMESTIC DEMAND Annual Total	DOMESTIC DEMAND Daily Average	EXPORTS Annual Total	EXPORTS Daily Average
Distillate Fuel Oil						
1932	73,883,000	201,900	65,101,000	177,900	8,782,000	24,000
1933	76,172,000	208,700	64,748,000	177,400	11,424,000	31,300
1934	89,330,000	244,700	74,824,000	205,000	14,506,000	39,700
1935	102,277,000	280,200	86,028,000	235,700	16,249,000	44,500
1936	123,205,000	336,600	102,757,000	280,800	20,448,000	55,800
1937	146,970,000	402,600	116,841,000	320,100	30,129,000	82,500
1938	147,090,000	403,000	117,449,000	321,800	29,641,000	81,200
1939	166,993,000	457,500	134,973,000	369,800	32,020,000	87,700
1940	179,991,000	491,800	160,851,000	439,500	19,140,000	52,300
1941	189,749,000	519,900	172,824,000	473,500	16,925,000	46,400
1942	207,236,000	567,700	185,661,000	508,600	21,575,000	59,100
1943	233,067,000	638,600	208,110,000	570,200	24,957,000	68,400
1944	252,811,000	690,700	209,320,000	571,900	43,491,000	118,800
1945	259,580,000	711,100	226,084,000	619,400	33,496,000	91,700
1946	272,318,000	746,100	242,965,000	665,700	29,353,000	80,400
1947	326,985,000	895,800	294,173,000	805,900	32,812,000	89,900
Residual Fuel Oil						
1932	250,268,000	683,800	239,056,000	653,200	11,212,000	30,600
1933	268,096,000	734,500	258,957,000	709,500	9,139,000	25,000
1934	279,646,000	766,100	265,547,000	727,500	14,099,000	38,600
1935	293,394,000	803,800	280,695,000	769,000	12,699,000	34,800
1936	322,319,000	880,700	307,884,000	841,200	14,435,000	39,500
1937	340,818,000	933,700	325,514,000	891,800	15,304,000	41,900
1938	309,753,000	848,600	291,833,000	799,500	17,920,000	49,100
1939	340,973,000	934,200	323,488,000	886,300	17,485,000	47,900
1940	356,272,000	973,400	340,163,000	929,400	16,109,000	44,000
1941	397,536,000	1,089,100	383,422,000	1,050,400	14,114,000	38,700
1942	417,792,000	1,144,600	405,697,000	1,111,500	12,095,000	33,100
1943	481,902,000	1,320,300	467,008,000	1,279,500	14,894,000	40,800
1944	524,556,000	1,433,200	512,020,000	1,399,000	12,536,000	34,200
1945	535,092,000	1,466,000	523,423,000	1,434,000	11,669,000	32,000
1946	486,637,000	1,333,300	477,151,000	1,307,300	9,486,000	26,000
1947	529,400,000	1,450,400	518,284,000	1,420,000	11,116,000	30,400

Source: U. S. Bureau of Mines except for latest year which has been estimated by WORLD OIL with aid of Bureau statistics for 10 months.

"THOSE ARE THE 5 REASONS WHY I'M FUSSY ABOUT DRILLING VERTICAL WELLS"

"Yes, I know some of the boys claim I'm *too* fussy—but they usually change their minds when they see how it pays off. First, controlled vertical drilling takes less time and uses fewer bits. Take my last well, for instance. Totco records every 50 or 100 feet told me what I was doing every foot of the way, so I was always drilling with the most efficient weight and speed. Bottomed that hole at 5400 feet in 19 days, used 21 bits, and was never 1° off. Fellow next to me took Totco readings only when he happened to think of it: he took 23 days and 29 bits to reach the same depth. And he had a crooked hole.

"Takes less power to drill a vertical well, too. Easier going in, easier coming out, and you don't wear out your drill pipe so fast, either. Another thing—drill a vertical hole, and you don't have to worry about stuck casing. You'll land the casing right where you want it, and get a better cement job, too. And if you want to hear some bad language, just ask one of the production boys about the trouble he has pumping in a crooked hole.

"But the big thing to me about controlled vertical drilling is the way it cuts down key-seating, washouts, twist-offs and the like. No rig-time lost on fishing jobs, no lost tools. No whipstocking. No backing up and re-drilling. Man, when you think it over, you can't *afford* to drill anything but a vertical well."

"That's why I drill vertical wells . . . I've neither the time nor the money to drill crooked wells!"

Based upon the actual statements of hundreds of drillers and drilling superintendents in all parts of the country, and in many foreign fields.

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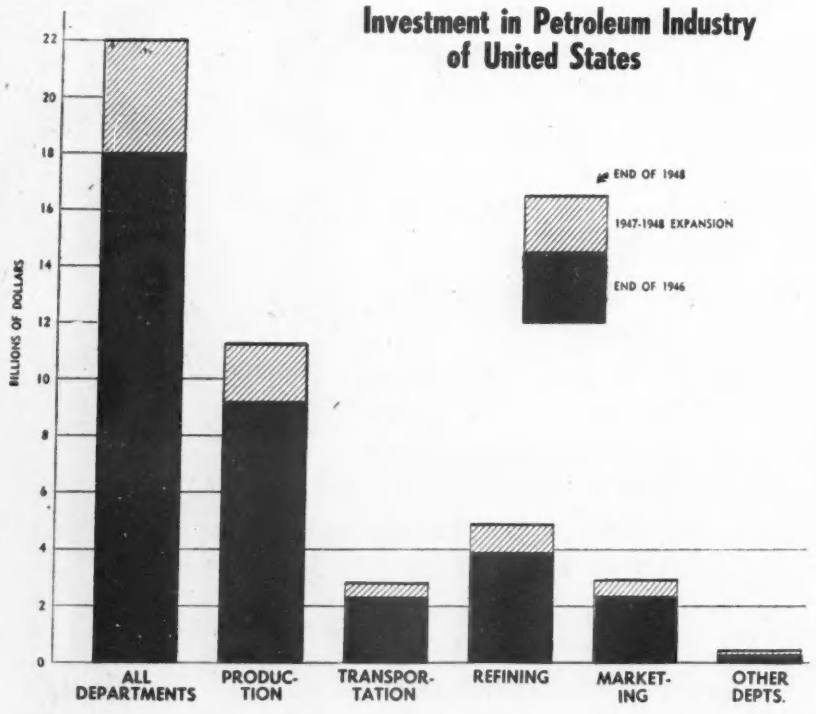
Industry Expansion

Pushes Investment Toward $40 Billion

THE petroleum industry has under way a vast and costly world-wide expansion of facilities, and by 1951 or 1952 it will represent a $40 billion industry — one with approximately that amount of gross investment in property, plant and equipment.

As early as the end of 1948 the world-wide petroleum industry will have expanded its gross capital investment to approximately $32 billion, compared with an estimated $27 billion at the end of 1946. Thus the industry during 1947 and 1948 alone plans to invest in enlarged facilities an amount equivalent to one-fifth of the investment it made in the preceding 87 years.

This current and prospective expansion of worldwide petroleum facilities will occur about in accordance with the timetable shown herewith.



(Estimated Gross Investment of Petroleum Industry in Property, Plant and Equipment Within the United States at End of 1946; Capital Investment To Be Made in 1947-1948; and Indicated Total Investment at End of 1948.)

DIVISION OF INDUSTRY	Gross Investment at End of 1946		Projected Capital Expenditures, 1947-1948		Gross Investment at End of 1948	
	Amount	% of Total	Amount	% of Total	Amount	% of Total
Production	$ 9,180,000,000	51.0	$2,000,000,000	50.0	$11,180,000,000	50.8
Transportation	2,340,000,000	13.0	440,000,000	11.0	2,780,000,000	12.7
Refining	3,870,000,000	21.5	1,000,000,000	25.0	4,870,000,000	22.1
Marketing	2,340,000,000	13.0	480,000,000	12.0	2,820,000,000	12.8
Others	270,000,000	1.5	80,000,000	2.0	350,000,000	1.6
Total, All Divisions	$18,000,000,000	100.0	$4,000,000,000	100.0	$22,000,000,000	100.0

Sources: Investment at end of 1946 estimated by World Oil, with aid of data in "Financial Analysis of 30 Oil Companies for 1946," by Joseph E. Pogue and Frederick G. Coqueron of Chase National Bank. Data for new investment scheduled for 1947-1948 from survey by American Petroleum Institute.

Gross Investment in Petroleum Industry
(Billions of Dollars)

REGION	End of 1946	End of 1948	1951-1952
United States	18	22	25.5
Other Countries	9	10	14.5
Total, World	27	32	40.0

This expansion program, made necessary in order to meet the strong and increasing demand for petroleum products throughout the world, will involve an increase of about 50 percent in the worldwide investment in the industry within a five-year period, or an average of about 10 percent per year and is in line with corresponding increases in demand.

For the world, an expansion and improvement program involving expenditures of about $13 billion was estimated by Dr. Joseph E. Pogue, vice president of the Chase National Bank, New York, in a recent article in the New York

Estimated Capital Expenditures by Petroleum Industry Throughout World Within Next Five Years (by 1951-1952)

ITEM	Estimated Expenditure	Percent of Total
Expenditures by Regions:		
United States	$ 7,500,000,000	57.3
Middle East	1,650,000,000	12.6
Europe Except Russia	1,275,000,000	9.7
South America	1,200,000,000	9.2
Far East	450,000,000	3.4
Others, Including Russia	1,025,000,000	7.8
Total, All Regions	$13,100,000,000	100.00
Expenditures by Types of Facilities:		
Crude Petroleum	$ 7,000,000,000	53.5
Refining	3,000,000,000	22.9
Marketing	1,400,000,000	10.7
Pipe Lines	1,000,000,000	7.6
Marine Equipment	500,000,000	3.8
Others	200,000,000	1.5
Total, All Types	$13,100,000,000	100.0

Source: Recent article in New York Journal of Commerce by Dr. Joseph E. Pogue, vice president of the Chase National Bank of New York.

Journal of Commerce. A breakdown of his figures by countries is shown in a table herewith, and there is also a breakdown by the different divisions of the industry. The U. S. is down for new capital investments aggregating $7.5 billion and other countries for about $5.5 billion for the five-year period. The Middle East and South America are also due to experience important expansion.

Of the total of about $13 billion to be spent for new facilities throughout the world in the five years, $7 billion or 53.5 percent will represent crude petroleum facilities, $1 billion the cost of pipe lines, $½ billion marine equipment, $3 billion refining facilities, and $1.4 billion marketing facilities.

Spending in U. S.

Within the U. S. alone there was an estimated gross investment of $18 billion in the petroleum industry at the end of 1946. A paper published by the Chase National Bank of New York, "Financial Analysis of 30 Oil Companies for 1946," by Dr. Pogue and Frederick G. Coqueron, of that bank, showed a gross investment in the U. S. of approximately $12 billion for those 30 companies which represented about two-thirds of the industry.

In the two years 1947-1948 there will be new capital expenditures in the petroleum industry of the U. S. totaling at least $4 billion, it was revealed in a survey by the American Petroleum Institute. This will bring the gross investment in the U. S. up to about $22 billion by the end of 1948.

This projected $4 billion expansion program in the U. S. for 1947-1948 is broken down by divisions of the industry in an accompanying table. Of the $4 billion total, 50 percent is earmarked for the production division, 22 percent for the refining division, 11 percent for transportation, 12 percent for improvement and expansion of marketing facilities, and 2 percent for other purposes. These percentages are closely in line with the proportions represented by the different departments in considering the existing facilities. Therefore, each department will have about the same proportion of the industry's total gross investment at the end of 1948 as it had at the end of 1946, following the current expansion.

Of the $22 billion gross investment indicated for the U. S. for the end of 1948, over $11 billion or 50.8 percent will be production division investment, 22.1 percent refining, 12.7 percent transportation, 12.8 percent marketing, and 1.6 percent other departments and unallocated items.

The above estimates of the new capital investment to be required worldwide and within the U. S. during the next several years probably will prove to be very conservative, judging by some other estimates, which have run higher. For example, Dr. Robert E. Wilson, chairman of the board of Standard Oil Company (Indiana), estimated in May, 1947, that the industry's necessary average annual capital expenditures for the next few years would be around $3 billion, considering only facilities within the U. S. and not including foreign expansion.

Citing the fact that the industry was using practically all of its efficient refining capacity, Dr. Wilson said that barring a major recession, the industry's refining facilities should be expanded by at least 5 percent per year for the next several years, while a similar amount of modern equipment should replace obsolescent or worn-out refining facilities. The industry's crude reserves must also be replaced, he stated, as fast as they are used up. "For our industry to replace each year, at present costs, 7 percent of its proven crude reserves, build or rebuild 10 percent of its refining facilities, and, say, 5 percent of its distribution facilities," said Dr. Wilson, "would mean annual capital expenditures of around $3 billion!"

Petroleum Demand

■ CONTINUED FROM PAGE 76

finery runs will average about 5,300,000 barrels daily for the year appears as optimistic as is justified, particularly in view of the possibilities of refinery strikes and other difficulties in keeping plants operating. Actual runs of 5,300,000 barrels daily by plants having average rated capacity of 5,714,000 barrels daily would indicate sustained refinery operations at 92.75 percent of capacity for the whole year. This would be the same as the abnormally high average rate maintained during the past eight months—since the beginning of June last year. It is questionable whether that rate can be improved upon this year, on a sustained basis, even though U. S. runs have been pushed above 95 percent of capacity in several recent individual weeks, with presently existing plants achieving actual runs substantially above 5,300,000 barrels daily. In order to average 5,350,000 barrels daily in 1948 as a whole, the refineries would have to maintain consistently the high operating rate of 93.6 percent of capacity.

Besides the crude oil run to stills at refineries, it is estimated that about 137,000 barrels per day will be exported, and substantial amounts will be transferred to fuel oil stocks, used as such for fuel, or lost in handling. For partially meeting these requirements of crude, there will be estimated imports of about 275,000 barrels per day, mostly heavy crude and specialties. But crude oil stocks are relatively light, and no material withdrawal from or addition to crude stocks seems likely. The remainder of the requirements for crude, to support refinery runs of 5,300,000 barrels daily, must come from domestic production, and domestic production averaging 5,325,000 barrels daily during 1948 will be required for bringing total crude supply up to the indicated demand for crude. As in each of the past several years, the indicated demand for domestic crude production in 1948 will be nearly the same as total refinery runs of crude, with net imports of crude approximately compensating for the volumes of crude used as fuel and lost in operations and handling.

The indicated demand of 5,325,000 barrels per day for domestic crude in 1948 would be supplied wholly from current production, assuming no net change in crude stocks for the year. Domestic crude production of that amount would be 248,000 barrels per day or 4.9 percent more than the production of 5,077,000 daily in 1947. It is here assumed that this production of 5,325,000 barrels per day of crude oil in 1948 will be achieved, although that would set a new all-time record and require the production of nearly all U. S. fields to the limits of their maximum efficiency rates. That this much domestic production will be possible is indicated by the recent unprecedented rates of production. In the four weeks ended January 24, 1948, U. S. crude production averaged 5,316,687 barrels daily, the API reported, and during the individual week ended January 24, 1948, the domestic production was at an all-time high of 5,336,287 barrels daily.

Besides the oils to be produced at the refineries, there will be available natural gasoline and benzol production in the U. S. estimated at 380,000 barrels daily in 1948. This is an increase of 18,000 barrels a day or 5 percent over the production of about 362,000 daily in 1947.

The estimated 5,705,000 barrels per day of domestic production of crude oil, natural gasoline, and benzol, plus imports of 275,000 daily of crude and 180,000 daily of refined products will provide total new supply of 6,160,000 barrels daily in 1948, and if 27,000 a day of the supply goes for needed building up of refined product stocks, then the remainder of 6,133,000 barrels daily is left available for supplying, in so far as possible, the U. S. domestic and export demand for petroleum products. This unprecedented supply obviously should be able to meet all really essential requirements, in spite of the sharp increases which have occurred in petroleum consumption.

Foreign Oil Trade

U. S. Becoming Net Importer

THE year 1948 undoubtedly will mark a revolutionary change in the foreign petroleum trade position of the U. S., with the nation reversing its historical position of exporting greater quantities than it imports.

Last year exports of oil from the U. S. exceeded the record volume imported into the country by the very small margin of 25,800 barrels per day, unusually sharp increases in annual importation rates since 1942 having largely wiped out the difference which has existed in preceding years. Imports during 1947 averaged 431,900 barrels daily against an export rate of 457,700 barrels per day.

Because of the difficulty the nation is experiencing in supplying enough petroleum to satisfy domestic requirements, a sharp reduction in export trade and a further growth in imports is in prospect, which means that the U. S. in all probability will become a net importer of oil during 1948 for the first time since 1922. The 1948 outlook is for import shipments to rise to an average of 455,000 barrels daily and for exports to decrease to around 407,000 barrels daily. This would represent an increase over 1947 of 5.3 percent in imports and a decrease of 11.1 percent in exports. Because of the domestic shortage of petroleum supplies, exports may decline more than this amount. Moreover, a much greater increase in imports undoubtedly would occur were it not for the world-wide shortage of tankers, which is restricting international movement to a considerable extent.

A trend of importing larger quantities and exporting smaller volumes is expected for the U. S. in coming years in view of an anticipated need for augmenting domestic supplies to satisfy domestic consumption. Hence, while the prospect that the nation will become a net importer in 1948 constitutes a reversal of the country's historical position, indications are that this will be characteristic hereafter.

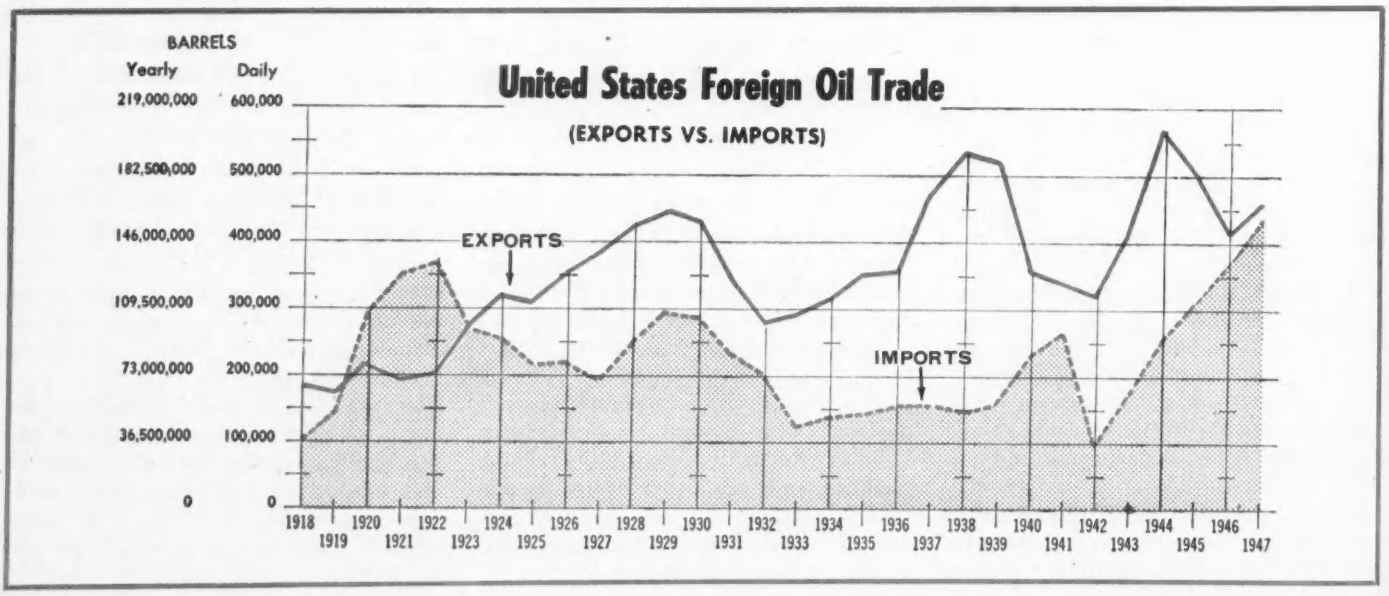
Imports Set New High

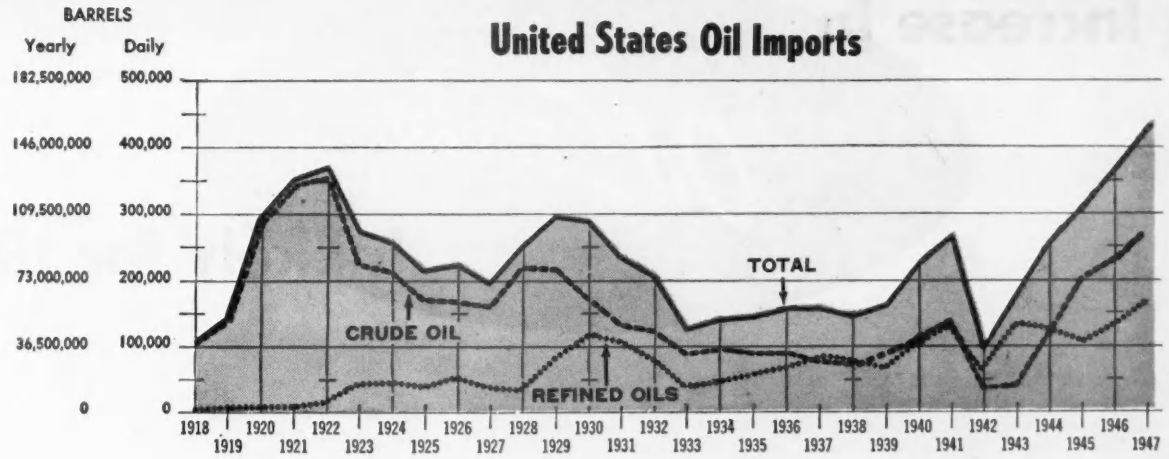
The growing importance of foreign oil imports to the U. S. is demonstrated by the fact that receipts in 1947 were equivalent to the daily crude production of Louisiana, the third largest producing state. During 1947 imports of petroleum into the U. S. reached a total of 157,673,000 barrels, setting a new all-time high. This constituted a daily average of 431,900 barrels contrasted with the previous peak of 372,500 barrels per day imported back in 1922. There has been a very sharp growth in oil import rates in recent years, amounting to a 70 percent gain since 1944, although this year itself was higher than the average during the preceding decade. The quantity of foreign-produced oil brought to this country last year was 62,000 barrels per day more than 1946 imports, 120,700 barrels above 1945's daily rate, and 179,700 barrels greater than during 1944.

Meanwhile, export shipments have declined from the peak they reached in 1944. Exports rose slightly during 1947 from the previous year, totaling 167,057,000 barrels to average 457,700 barrels daily as compared with 414,200 barrels per day in 1946. Nevertheless, the 1947 rate was almost exactly 100,000 barrels per day less than the high of 567,200 barrels exported daily in 1944.

Imports last year consisted of 97,032,000 barrels (265,800 barrels per day) of crude oil and 60,641,000 barrels (166,100 per day) of refined oils, which represented a gain over the preceding year of 12.7 percent in crude and 23.9 percent in refined products.

As in previous years, the bulk of the imported oils came from the Caribbean area, with Venezuela crude and products bulking large in the totals.

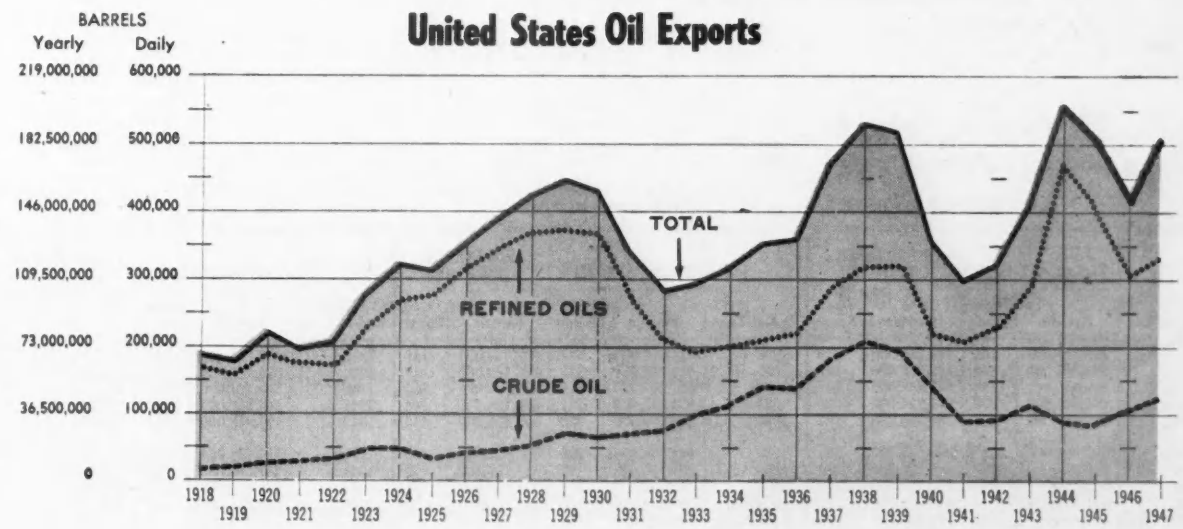




(All Figures in Barrels)

	IMPORTS						EXPORTS					
	CRUDE OIL		REFINED PRODUCTS		TOTAL IMPORTS		CRUDE OIL		REFINED PRODUCTS		TOTAL EXPORTS	
YEAR	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average
1918.....	37,736,000	103,400	1,227,000	3,400	38,963,000	106,800	5,884,000	16,100	62,234,000	170,500	68,118,000	186,600
1919.....	52,822,000	144,700	1,376,000	3,800	54,198,000	148,500	6,348,000	17,400	57,545,000	157,600	63,893,000	175,100
1920.....	106,175,000	290,100	2,647,000	7,200	108,822,000	297,300	9,295,000	25,400	70,323,000	192,100	79,618,000	217,500
1921.....	125,364,000	343,500	3,428,000	9,400	128,792,000	352,900	9,527,000	26,400	62,254,000	170,500	71,881,000	196,900
1922.....	130,255,000	356,800	5,719,000	15,700	135,974,000	372,500	10,805,000	29,600	63,745,000	174,600	74,550,000	204,200
1923.....	82,015,000	224,700	17,638,000	48,300	99,653,000	273,000	17,534,000	48,000	84,800,000	232,300	102,334,000	280,300
1924.....	77,775,000	212,500	16,806,000	45,900	94,581,000	258,400	18,239,000	49,800	99,089,000	270,700	117,328,000	320,500
1925.....	61,824,000	169,400	16,376,000	44,900	78,200,000	214,300	13,337,000	36,500	100,684,000	275,900	114,021,000	312,400
1926.....	60,382,000	165,400	20,938,000	57,400	81,320,000	222,800	15,407,000	42,200	116,999,000	320,600	132,406,000	362,800
1927.....	58,383,000	159,900	13,353,000	36,600	71,736,000	196,500	15,844,000	43,400	126,419,000	346,400	142,263,000	389,800
1928.....	79,767,000	218,000	11,790,000	32,200	91,557,000	250,200	18,966,000	51,800	135,991,000	371,600	154,957,000	423,400
1929.....	78,933,000	216,200	29,777,000	81,600	108,710,000	297,800	26,401,000	72,300	136,719,000	374,600	163,120,000	446,900
1930.....	62,129,000	170,200	43,489,000	119,200	105,618,000	289,400	23,705,000	64,900	132,790,000	363,800	156,495,000	428,700
1931.....	47,250,000	129,500	38,837,000	106,400	86,087,000	235,900	25,535,000	70,000	98,819,000	270,700	124,354,000	340,700
1932.....	44,682,000	122,100	29,812,000	81,400	74,494,000	203,500	27,393,000	74,900	75,882,000	207,300	103,275,000	282,200
1933.....	31,893,000	87,400	13,501,000	37,000	45,394,000	124,400	36,584,000	100,200	70,143,000	192,200	106,727,000	292,400
1934.....	35,558,000	97,400	14,936,000	40,900	50,494,000	138,300	41,127,000	112,700	73,380,000	201,000	114,507,000	313,700
1935.....	32,239,000	88,300	20,396,000	55,900	52,635,000	144,200	51,430,000	140,900	77,557,000	212,500	128,987,000	353,400
1936.....	32,327,000	88,300	24,777,000	67,700	57,104,000	156,000	50,312,000	137,400	81,681,000	223,300	131,994,000	360,600
1937.....	27,484,000	75,300	29,673,000	81,300	57,157,000	156,600	67,234,000	184,200	105,600,000	289,300	172,834,000	473,500
1938.....	26,412,000	72,400	27,896,000	76,400	54,308,000	148,800	77,254,000	211,700	116,474,000	319,100	193,728,000	530,800
1939.....	33,095,000	90,700	25,965,000	71,100	59,060,000	161,800	72,076,000	197,500	116,883,000	320,200	188,959,000	517,700
1940.....	42,662,000	116,600	41,089,000	112,200	83,751,000	228,800	51,496,000	140,700	78,970,000	215,800	130,466,000	356,500
1941.....	50,606,000	138,700	46,536,000	127,500	97,142,000	266,200	33,238,000	91,100	75,592,000	207,100	108,830,000	298,200
1942.....	12,297,000	33,700	23,669,000	64,800	35,966,000	98,500	33,834,000	92,700	83,073,000	227,600	116,907,000	320,300
1943.....	13,833,000	37,900	49,579,000	135,800	63,412,000	173,700	41,342,000	113,200	108,615,000	297,600	149,957,000	410,800
1944.....	44,805,000	122,400	47,506,000	129,800	92,311,000	252,200	34,238,000	93,500	173,378,000	473,700	207,616,000	567,200
1945.....	74,337,000	203,600	39,282,000	107,600	113,619,000	311,200	32,998,000	90,400	149,985,000	410,900	182,983,000	501,300
1946.....	86,066,000	235,800	48,967,000	134,100	135,033,000	369,900	40,750,000	111,600	110,454,000	302,600	151,204,000	414,200
1947.....	97,032,000	265,800	60,641,000	166,100	157,673,000	431,900	46,034,000	126,100	121,023,000	331,600	167,057,000	457,700

Source: U. S. Bureau of Mines, except for latest year, which is estimated by WORLD OIL with aid of Bureau statistics for first 10 months.



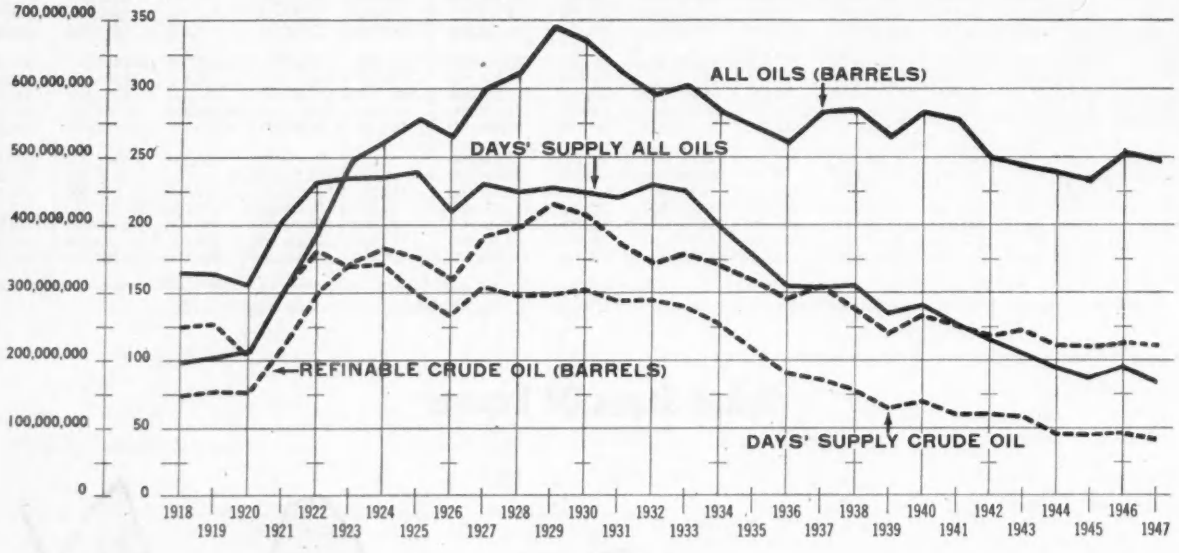
Big Increase I… Oil Stocks …kely for 1948

ALTHOUGH 1947 began with the industry in a fairly satisfactory oil stocks position, its closing found that position somewhat changed. Over-all oil stocks at the start of 1948 were almost 14 million barrels less than they had been a year earlier and this year will probably not bring any large upward change to these stocks. Early forecasts for 1947 had looked for moderate increases in oil inventories, but these had not been able to foresee the tremendous increase in demand that occurred, and the industry finds itself entering a new year in which demand for its products will be even higher and with stockpiles than can hardly be considered adequate.

In 1947, the stocks of all oils were lowered 13,944,000 barrels, an average of 38,000 barrels daily, to total 493,150,000 barrels at the end of the year. This aggregate figure was not much more than was in the nation's tanks during most of the war years and was even less than was on hand at the end of 1942 before war had reached the all-out level. Compared with the oil on hand at the time the U. S. was attacked in 1941, current inventories are far less. Not only are stocks less, but demand for these oils is far greater.

At the end of 1941 stocks totaling 552,328,000 barrels represented 127 days' supply based on daily demand for that year, but today's material would last only 83 days even if need in 1948 did no more than equal that of 1947, but that will not be true. Demand for all oils in 1948 is estimated by WORLD OIL to be increased over 1947 by almost 4 percent. On this daily demand basis,

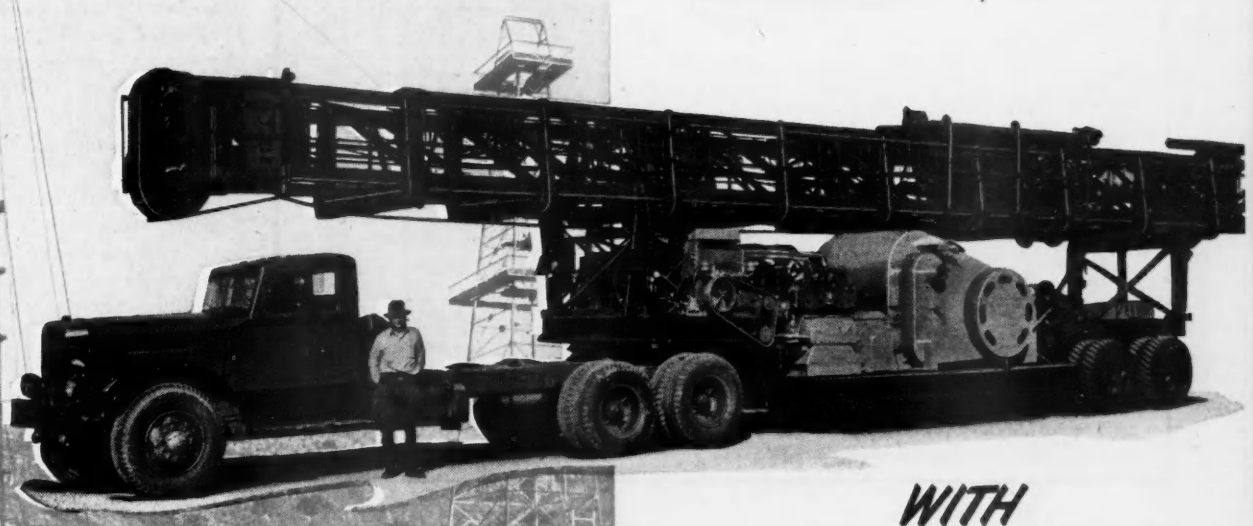
United States Petroleum Storage And Days' Supply



(All Figures in Barrels)

	TOTAL ALL OILS		REFINABLE CRUDE OIL			TOTAL ALL OILS		REFINABLE CRUDE OIL			TOTAL ALL OILS		REFINABLE CRUDE OIL	
End of Year	Barrels	Days' Supply	Barrels	Days' Supply	End of Year	Barrels	Days' Supply	Barrels	Days' Supply	End of Year	Barrels	Days' Supply	Barrels	Days' Supply
1918.....	193,411,000	165	144,336,000	125	1928.....	621,010,000	224	392,629,000	148	1938.....	567,703,000	156	274,165,000	79
1919.....	200,383,000	164	149,356,000	127	1929.....	689,166,000	228	428,445,000	149	1939.....	525,838,000	135	238,910,000	66
1920.....	209,845,000	156	149,448,000	103	1930.....	665,497,000	224	411,882,000	153	1940.....	563,277,000	141	264,079,000	70
1921.....	294,428,000	203	217,324,000	150	1931.....	621,673,000	221	370,194,000	144	1941.....	552,328,000	127	247,499,000	61
1922.....	385,349,000	232	295,708,000	181	1932.....	590,106,000	230	339,875,000	145	1942.....	497,940,000	116	234,889,000	61
1923.....	492,088,000	235	340,637,000	169	1933.....	602,198,000	226	354,223,000	140	1943.....	485,598,000	106	243,506,000	59
1924.....	520,287,000	236	360,475,000	171	1934.....	564,350,000	199	337,254,000	128	1944.....	477,089,000	95	220,862,000	46
1925.....	552,464,000	239	345,863,000	150	1935.....	541,700,000	178	314,855,000	109	1945.....	463,579,000	87	218,763,000	45
1926.....	527,084,000	210	315,029,000	133	1936.....	519,229,000	155	288,579,000	91	1946.....	507,094,000	95	224,473,000	45
1927.....	597,176,000	231	379,660,000	155	1937.....	564,728,000	154	305,833,000	87	1947.....	493,150,000	83	221,319,000	41

ON THE JOB COMPLETE THE JOB FASTER



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Stocks of Crude Petroleum in U. S. by Grades, at End of December

(Based on Weekly Reports of U. S. Bureau of Mines)

(THOUSANDS OF BARRELS)

GRADE OR ORIGIN	Dec. 27, 1941	Dec. 29, 1945	Dec. 28, 1946	Dec. 27, 1947	Change 1941-1947	Change 1946-1947
Pennsylvania Grade	3,642	1,923	2,332	2,185	— 1,457	— 147
Other Appalachian	1,427	1,425	1,701	1,272	— 155	— 429
Lima-Michigan	1,360	1,012	1,076	939	— 421	— 137
Illinois-Indiana	18,201	15,759	14,480	8,900	— 9,301	— 5,580
Arkansas	2,708	2,566	2,890	3,296	+ 588	+ 406
Kansas	7,481	9,611	9,426	7,754	+ 273	— 1,672
Louisiana	12,901	13,202	11,745	12,497	— 404	+ 752
Northern	4,078	3,492	3,122	3,355	— 723	+ 233
Gulf Coast	8,823	9,710	8,623	9,142	+ 319	+ 519
Mississippi	2,290	2,451	2,924	2,778	+ 488	— 146
New Mexico	6,862	6,164	6,147	6,100	— 762	— 47
Oklahoma	51,582	34,137	31,163	26,032	—25,550	— 5,131
Texas	82,155	102,763	105,884	114,202	+32,047	+ 8,318
East Texas	20,287	17,148	15,930	17,803	— 2,484	+ 1,873
West Texas	18,682	32,476	39,911	43,387	+24,705	+ 3,476
Gulf Coast	24,153	28,008	28,333	28,712	+ 4,559	+ 379
Other Texas	19,033	25,131	21,710	24,300	+ 5,267	+ 2,590
Panhandle	.....	4,479	3,773	2,868	.....	— 905
North	.....	6,117	4,992	7,526	.....	+ 2,534
South	.....	5,907	5,172	5,510	.....	+ 338
Other	.....	8,628	7,773	8,396	.....	+ 623
Rocky Mountain	16,095	7,089	10,486	9,289	— 6,806	— 1,197
California	35,083	18,124	21,720	23,950	—11,133	+ 2,230
Foreign	2,203	2,692	4,021	3,583	+ 1,380	— 438
Total Refinable in U.S.	243,990	218,918	225,995	222,777	—21,213	— 3,218
Heavy in California	9,925	4,505	5,631	5,707	— 4,218	+ 76
Total in U.S.	253,915	223,423	231,626	228,484	—25,431	— 3,142

current stocks would amount to only about 80 days' supply. By these comparisons it is quite evident that as stocks are lowered or even kept on even keel and with demand continuing to mount, the industry's stocks position would continue to become even less favorable.

It appears that by the end of 1948 total stocks will be about 10 million barrels greater than at the start of the year, and will be about the same as at the end of 1946, two years earlier. For the purpose of the supply and demand forecast for 1948, WORLD OIL assumed that there would be little or no net change in stocks of crude oil and natural gasoline, but that there would be an average increase of about 27,000 barrels of refined products per day.

Refinable crude oil stocks were lowered 3,154,000 barrels during 1947, ending the year at 221,319,000 barrels. That amount was 41 days' supply based on the 1947 crude oil daily needs, and with the coming year's increased crude requirements taking practically all of supply, thereby allowing little or no additions to stocks, the days' supply ratio will be still lower at the end of the year. It may be noted that in two of the accompanying tables different totals for refinable crude stocks are shown. In order that crude stocks be presented by grade or origin, it was necessary tc utilize the U. S. Bureau of Mines weekly report for December 27, thereby accounting for a different total than is shown for the end of the year.

Although the nation as a whole showed over a 3 million-barrel drop in crude stocks, some areas were able to add to their inventories during 1947. Texas showed an increase of over 8 million barrels and ended the year with 114,202,000 barrels. Compared with 1941 that was a still greater increase of 32,047,000 barrels. Crude inventories in California showed improvement during the year, gaining 2,230,000 barrels of refinable crude to a 23,950,000-barrel total and 76,000 barrels of non-gasoline bearing stocks to a total of 5,707,000 barrels of the heavy material. However, California's stocks were still more than 15 million barrels less than were being held at the end of 1941.

Showing a very slight gain during the course of the year were finished and unfinished gasoline stocks. At the begining of 1947 they amounted to 92,742,000 barrels and at the end they totaled 92,886,000 barrels.

Gas oil and distillate fuel oils dropped from 59,620,000 barrels at the start of 1947 to 50,161,000 by the end of the year. Over 7 million barrels of this drop occurred at the East Coast where shortages of these fuels are now quite evident. These figures are for material at refineries and at terminals and do not include that in consumers tanks and other secondary storage facilities, which are believed to contain much more than at the same time a year ago as a result of warnings of impending shortages. However, that area will continue to feel the pinch of shortness of supply until additional transportation facilities are available to move displaced fuel oil supplies.

Stocks of Major Petroleum Products Held by Refining Companies in the United States at End of December, 1947, compared with 1941 and 1946

Stocks at refineries, at bulk terminals, in transit, and in pipe lines. Data for 1941 and 1946 from Bureau of Mines monthly reports; for 1947 from weekly reports of American Petroleum Institute.

(THOUSANDS OF BARRELS)

DISTRICT	FINISHED AND UNFINISHED GASOLINE Stocks End of December			KEROSINE Stocks End of December			GASOIL AND DISTILLATE FUEL Stocks End of December			RESIDUAL FUEL OIL Stocks End of December		
	1941	1946	1947	1941	1946	1947	1941	1946	1947	1941	1946	1947
East Coast	21,183	19,554	19,994	2,489	7,806	6,157	18,631	20,613	13,219	10,041	8,399	7,098
Appalachian	3,684	3,502	3,239	311	477	438	704	568	911	578	528	596
District No. 1	.....	2,544	2,171	.....	425	314	.....	482	623	.....	322	419
District No. 2	.....	958	1,068	.....	52	124	.....	86	288	.....	206	177
Ind., Ill., Ky	18,327	17,832	17,131	1,168	2,006	2,478	5,552	6,114	7,032	4,152	4,200	5,066
Okla., Kans., Mo.	8,875	8,683	8,556	618	971	860	1,766	2,536	3,176	2,046	1,280	1,641
Texas Inland	3,288	3,512	3,272	282	402	532	301	492	498	1,349	736	739
Texas Gulf	15,831	14,261	16,349	2,949	2,921	2,503	7,801	12,150	7,816	8,710	6,935	7,179
Louisiana Gulf	3,303	5,148	4,889	513	1,436	1,702	1,798	3,942	2,772	2,217	1,864	2,016
Ark. and La. Inland	806	1,672	1,576	213	358	319	341	512	393	368	143	163
Rocky Mountains	1,809	2,065	2,042	129	106	164	319	452	838	535	604	690
District No. 3	.....	99	82	.....	3	25	.....	26	24	.....	51	25
District No. 4	.....	1,966	1,960	.....	103	139	.....	426	814	.....	553	665
California	16,992	16,513	15,838	927	598	963	12,713	12,241	13,506	53,199	22,405	20,359
Total United States	94,098	92,742	92,886	9,599	17,081	16,116	49,926	59,620	50,161	83,195	47,094	45,547

Additional Advances Likely for Petroleum Prices

LIKE other businesses, the petroleum industry was unable to avoid the influences of inflation, higher operating costs and supply shortages. With all these forces active, it was not surprising that petroleum prices in 1947 scored their sharpest jump in more than two decades. With these same influences still actively at work, prospects are for additional upward advances in oil prices in coming months . . . unless Congress votes a price control bill it has under consideration.

Sharp Price Advances

Crude prices, which began the year with a national average of $1.67 per barrel, advanced 94 cents a barrel or 56 percent to reach $2.61 per barrel by the close of the year. At this new level they were the highest since 1920. Obviously, corresponding raises in refinery prices of petroleum products followed the same general trend in order to cover the increase in crude cost.

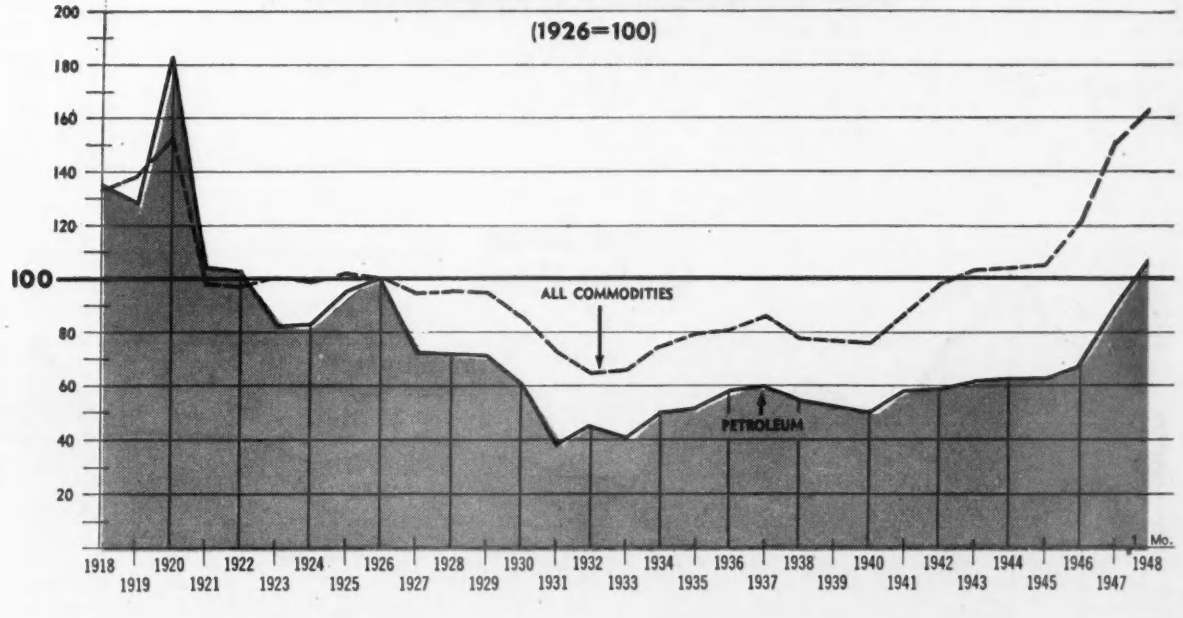
The year saw three widespread crude price increases posted, two of them coming in the last three months of the year. Major adjustment was a 50-cent per barrel hike in December, one of the biggest single increases in history; hence crude prices throughout the year averaged only $1.95 a barrel in contrast with the year end average of $2.61 per barrel. Even so, the average price during 1947 compared with $1.42 average for 1946.

With every barrel of oil which can possibly be produced and transported needed in 1948 to satisfy insatiable demand for oil products, the outlook is for further price increases and certainly no reduction from the present high mark. The quite large price boosts near the end of the year failed to check the payment of premiums for crude, and at this writing many smaller refining firms are paying bonuses above posted prices, a situation which inevitably forces the larger buyers to post a higher price in order to prevent the loss of crude supply sources. Consequently, with the single exception of the $3.07 price which existed in 1920, the highest average price per barrel of crude oil since 1872 should be experienced in 1948.

Oil Prices Lag

Although petroleum prices have advanced sharply since the lifting of government controls, they have not climbed as rapidly as commodities in general.

Wholesale Price Indices
All Commodities Vs. Petroleum Products



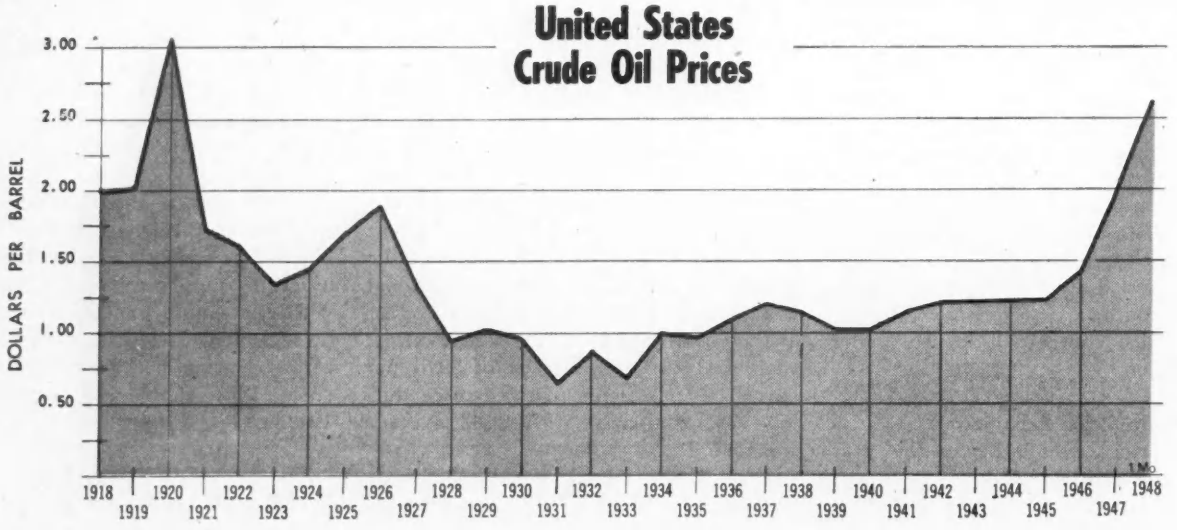
YEAR	All Commodities	Petroleum	YEAR	All Commodities	Petroleum	YEAR	All Commodities	Petroleum	YEAR	All Commodities	Petroleum	YEAR	All Commodities	Petroleum
1918.....	131.3	135.3	1924.....	98.1	83.5	1930.....	86.4	61.5	1936.....	80.8	57.3	1942.....	98.8	59.8
1919.....	138.6	128.0	1925.....	103.5	95.0	1931.....	73.0	39.5	1937.....	86.3	60.5	1943.....	103.2	62.5
1920.....	154.4	183.5	1926.....	100.0	100.0	1932.....	64.8	45.4	1938.....	78.6	55.9	1944.....	104.0	63.9
1921.....	97.6	104.4	1927.....	95.4	72.7	1933.....	65.9	41.0	1939.....	77.1	52.2	1945.....	105.8	63.5
1922.....	96.7	102.9	1928.....	96.7	72.0	1934.....	74.9	50.5	1940.....	78.6	50.0	1946.....	121.1	67.5
1923.....	100.6	82.6	1929.....	95.3	71.3	1935.....	80.0	51.3	1941.....	87.3	57.0	1947.....	151.7	89.3
												1948 (1 mo.)	163.0	107.9

Federal government indices show that the average wholesale price for all commodities at the beginning of 1948 had risen 63 percent above the 1926 level while petroleum product prices were only 7.9 percent higher than the 1926 base.

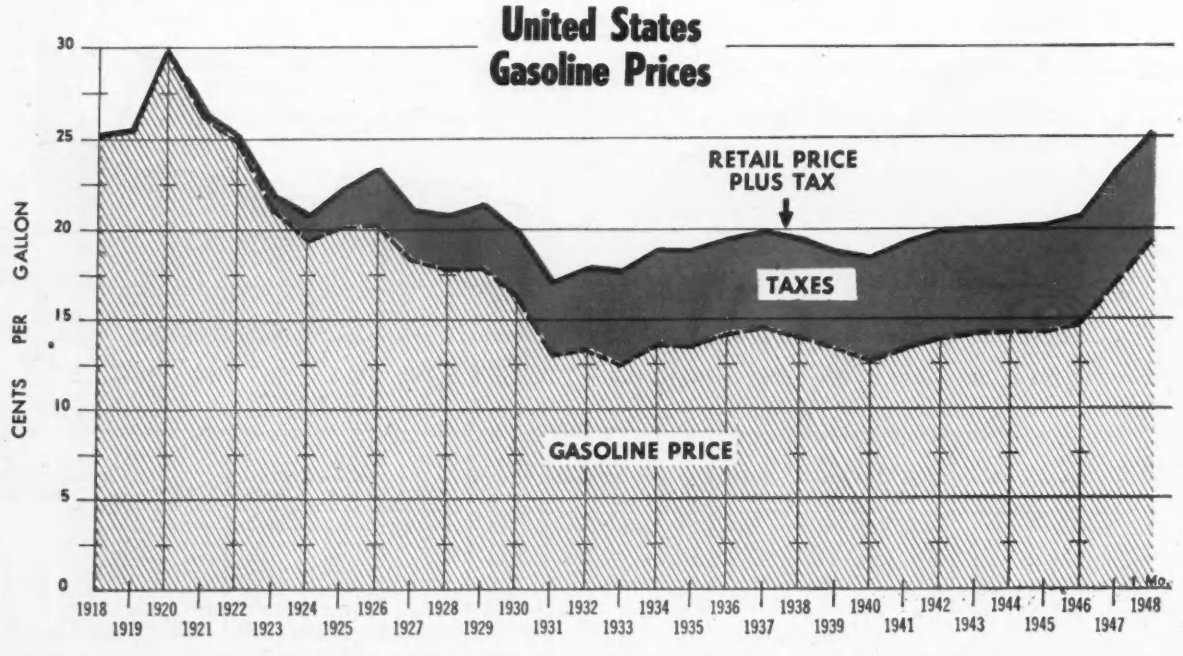
The average price of crude ($2.61 per barrel) was still more moderately priced than other materials when compared with the 1926 relationship, the normal year used as a base by the Bureau of Labor in preparing statistics on wholesale commodity price indices. While all commodities in the aggregate were 63 percent above the average 1926 level, crude prices were only 39 percent above the 1926 level of $1.88 per barrel.

Commodity prices at the beginning of 1948 were nearly 10 percent larger than the peak reached in 1920 after World War I, but crude oil at the new price of $2.61 per barrel was considerably under the 1920 average of $3.07 a barrel.

In contrast with retail prices of foods and many other goods, retail prices of



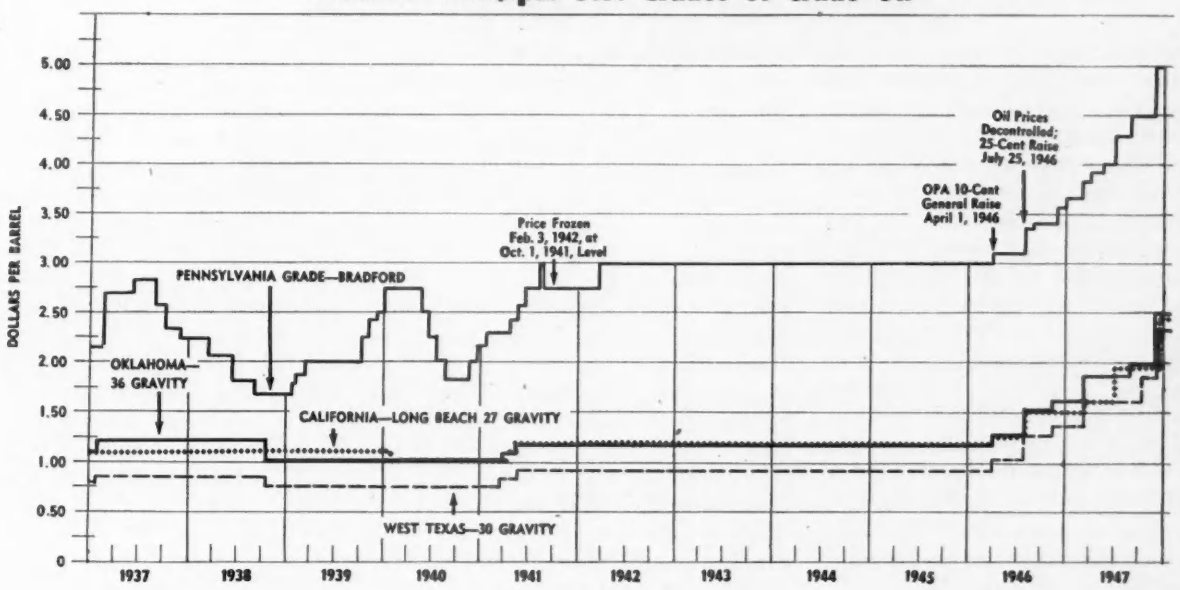
YEAR	CRUDE OIL DOLLARS PER BARREL At Wells	GASOLINE CENTS PER GALLON 50 Cities Average Without Tax	Tax	With Tax	YEAR	CRUDE OIL DOLLARS PER BARREL At Wells	GASOLINE CENTS PER GALLON 50 Cities Average Without Tax	Tax	With Tax	YEAR	CRUDE OIL DOLLARS PER BARREL At Wells	GASOLINE CENTS PER GALLON 50 Cities Average Without Tax	Tax	With Tax
1918...	1.98	25.12	0.00	25.12	1928...	1.17	17.90	3.04	20.94	1938...	1.13	14.07	5.44	19.51
1919...	2.01	25.41	0.06	25.47	1929...	1.27	17.92	3.50	21.42	1939...	1.02	13.31	5.44	18.75
1920...	3.07	29.74	0.09	29.83	1930...	1.19	16.17	3.78	19.95	1940...	1.02	12.75	5.66	18.41
1921...	1.73	26.11	0.20	26.31	1931...	.65	12.98	4.00	16.98	1941...	1.14	13.30	5.93	19.23
1922...	1.61	24.82	0.38	25.20	1932...	.87	13.30	4.63	17.93	1942...	1.19	13.96	5.97	19.93
1923...	1.34	21.06	0.91	21.97	1933...	.67	12.41	5.41	17.82	1943...	1.20	14.12	5.97	20.09
1924...	1.43	19.46	1.48	20.94	1934...	1.00	13.64	5.21	18.85	1944...	1.21	14.19	5.97	20.16
1925...	1.68	20.09	2.11	22.20	1935...	.97	13.55	5.29	18.84	1945...	1.22	14.22	6.02	20.24
1926...	1.88	20.97	2.41	23.38	1936...	1.09	14.10	5.35	19.45	1946...	1.42	14.69	6.08	20.77
1927...	1.30	18.29	2.80	21.09	1937...	1.18	14.59	5.40	19.99	1947...	1.95	16.99	6.18	23.17
										1948 (1 mo.)	2.61	19.29	6.28	25.57



gasoline also had increased quite moderately. Whereas the service station price of gasoline, excluding taxes, averaged 29.74 cents per gallon in 1920 and 20.97 cents in 1926, it was 19.29 cents per gallon the first of 1948. True, the consumer in early 1948 was paying 25.57 cents a gallon in contrast with 23.38 in 1926 and 29.83 in 1920, but this was due to higher taxes which now average 6.28 cents a gallon against 2.41 cents in 1926 and .09 cent per gallon in 1920.

Powerful major companies actively resisted the posting of the last two crude price advances, particularly the size of the latest increase. They based their opposition on arguments that price boosts should be avoided to help stave off the evils of inflation; that higher prices could be justified only if they would bring forth additional crude production which, it was claimed, could not be done because of steel and other shortages handicapping operations. Although unspoken, there also was fear that the new prices would invite public ill will and encourage the imposition of government control on the industry. Opponents to "holding-the-line" on prices challenged arguments that higher prices would not stimulate production, asserting it would at least encourage the working over of wells, production from marginal wells, inauguration of secondary recovery, and other extra efforts.

Prices of Principal U.S. Grades of Crude Oil



DATE	Pennsylvania Grade, Bradford	Oklahoma-Kansas 36-36.9° Gravity	California, Long Beach 27-27.9° Gravity	West Texas 30-30.9° Gravity
1937—				
Prior to January 1	$2.15	$1.10	$1.10	$0.78
January 28	....	1.22	....	0.88
February 24	2.67	....	....	....
June 7	2.82	....	....	....
September 1	2.60	....	....	....
October 12	2.35	....	....	....
December 1	2.20	....	....	....
1938—				
March 7	2.05	....	....	....
June 13	1.80	....	....	....
September 1	1.68	....	....	....
October 12	....	1.02	....	0.75
1939—				
January 21	1.80	....	....	....
February 1	1.88	....	....	....
March 6	2.00	....	....	....
October 6	2.25	....	....	....
November 1	2.40	....	....	....
December 1	2.50	....	....	....
1940—				
January 1	2.75	....	....	....
February 1	....	....	1.03	....
May 22	2.50	....	....	....
June 18	2.25	....	....	....
July 12	2.00	....	....	....
August 18	1.85	....	....	....
November 12	2.00	....	....	....
December 17	2.15	....	....	....
1941—				
January 27	2.30	....	....	....
March 29	....	....	....	0.82
April 1	....	1.07	....	....
April 23	2.40	....	....	....
April 24	....	....	1.09	....
May 20	2.55	1.17	....	....
May 21	....	....	....	0.92
May 23	....	....	1.15	....
Prior to June 1	2.55	1.17	1.15	0.92
June 18	2.75	....	....	....
August 14	2.98	....	....	....

DATE	Pennsylvania Grade, Bradford	Oklahoma-Kansas 36-36.9° Gravity	California, Long Beach 27-27.9° Gravity	West Texas 30-30.9° Gravity
1941—Continued				
August 23	$2.75	$....	$....	$....
October 1 (Prices later frozen at levels of this date)	....	....	....	....
1942—				
February 3 (Prices frozen by O.P.A. at October 1, 1941 level)	....	....	....	....
March 26 (O. P. A. granted Penn. Grade raise)	3.00	....	....	....
1943—(Prices frozen)	....	....	....	....
1944—(Prices frozen)	....	....	....	....
1945—(Prices frozen)	....	....	....	....
1946—				
April 1 (O.P.A. 10c Raise)	3.10	1.27	1.25	1.02
July 25 (Oil Prices Decontrolled)	....	1.52	....	1.27
August 1	3.35	....	1.50	....
September 1	3.41	....	....	....
November 15	....	1.62	....	....
November 19	....	....	....	1.37
December 9	3.55	....	....	....
1947—				
January 1	3.65	....	....	....
March 1	3.81	....	....	....
March 10	....	1.87	....	1.62
March 19	....	....	1.75	....
April 1	3.91	....	....	....
May 16	4.05	....	....	....
July 1	4.30	....	1.95	....
September 1	4.50	....	....	....
October 15	....	2.07	....	....
October 16	....	....	....	1.82
December 1	5.00	....	....	....
December 6	....	2.57	....	....
December 8	....	....	....	2.32
December 27	....	....	2.45	....

Legislative Outlook for Oil Industry During 1948

By RUSSELL B. BROWN
General Counsel, Independent Petroleum Association of America

IT HAS been about 17 years since the writer first attempted to inform the members of the Independent Petroleum Association of America on governmental trends in Washington. One of the early realizations was that nothing is more hazardous than prophecy. Time has served to intensify that feeling. I begin, in response to the editor's request for a discussion of the current and prospective legislative situation, with this disclaimer of foreknowledge of how anything that is presently considered, advocated or contemplated is likely to turn out. I do not know and I want to avoid any impression that prediction is attempted.

There are a number of legislative issues which many in the oil industry are watching keenly. On some the industry is practically unanimous. A difference of opinion exists with regard to others. It is one of the strong features of our form of government that opportunity is presented at some stage of legislative activity on any given subject for the expression of views. This is the way in which the compass course can be corrected.

Petroleum and natural gas have occupied a great deal of time in the activities of the Congress in recent months. In 1947 for the first time, barring the periods of curtailment of use of petroleum products by civilian consumers in the two world wars, the public found that it could not have all of every kind of product it wanted in every locality. The reasons have been widely discussed and by now should be fairly well understood by all. On the basis of this situation there has been an outpouring of predictions of calamity yet to come and to become greater. It is the function of the Congress to separate fact from fallacy. Thus, there has been a multiplicity of hearings. In recent weeks committees that formerly were content to leave the general subjct of petroleum to other groups that traditionally kept watch over it have found that they required more and specialized information. Hence, there has been an enormous record of testimony and much of it has been a duplicate of testimony of the same witnesses.

I am not one who deplores or even regrets that there has been such duplication. There has been much discussion in the oil industry for years as to the necessity of making known the facts on petroleum. Here is the opportunity to go directly to the policy-making branch of government with the facts. We are doing it by invitation each time any of us appear before a committee. The principal business of the industry is to find petroleum and make available petroleum products in quantity which satisfies the consumers. We differ among ourselves at times as to the best way to do this, but the end result thus far has been one that justified a feeling of pride.

Personally, I welcome every occasion for the discussion of our problems and our ambitions. I doubt that many members of the Congress have the time to read much about the petroleum industry. They have to be informed on so many things that they must rely on the committee method of learning about oil or any other subject.

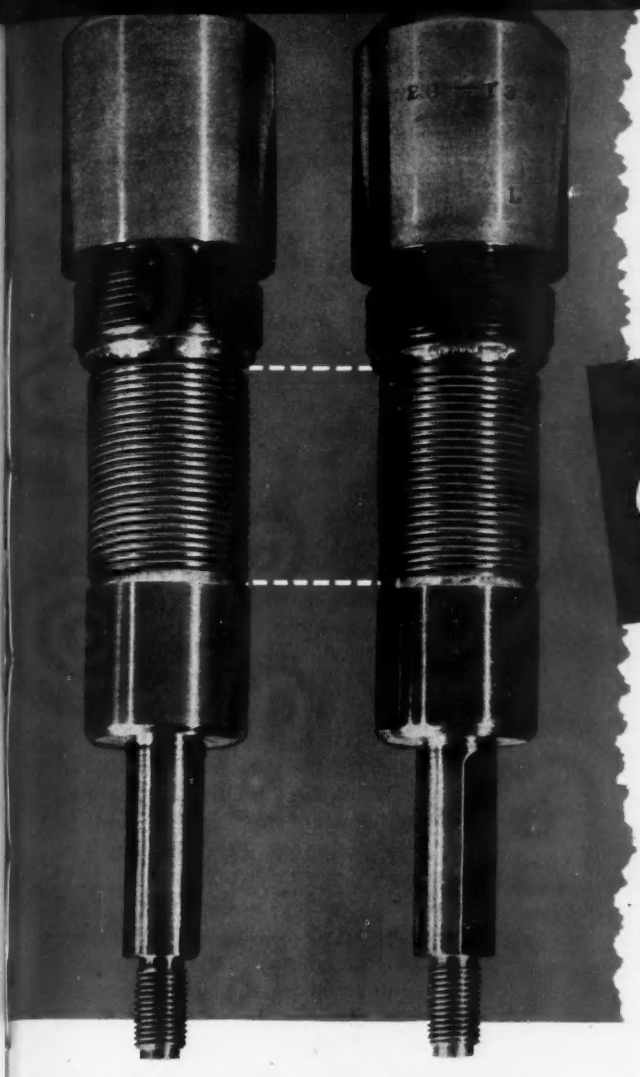
Program Crowded

The program of this Congress is crowded far beyond normal. There are many things that require prompt action and to add to the legislative difficulties, there is the understandable necessity of adjourning sometime around mid-year. This is election year and every seat in the House and 32 in the Senate are to be filled. Naturally, all the incumbents who want to be reelected like to have a few weeks to present their case to the voters. So one thing that can be predicted with some assurance is that barring the intervention of some international crisis sometime around July the 80th Congress will have adjourned.

It may be, therefore, that only a few outstanding questions relating to petroleum will be fitted into the legislative program. Congress has two big general subjects to deal with, appropriations and the European recovery program. Either is a gigantic undertaking. The budget in its printed form is a book much larger than the usual mail-order catalog. It weighs nearly seven pounds and at least half of it is in type of the size which WORLD OIL uses to print tabular matter. The book represents requests of the President for nearly $40 billion to be spent in one year . . . July 1 next to July 1, 1949. Already supplemental appropriations to finish out the current fiscal year have been asked in an amount great enough to bring to about $42 billion the amount which the Congress is asked to authorize and appropriate before this fiscal year ends.

Many of us might wish that the Congress had nothing to do except to give the appropriations question the kind of security it needs. Bureaus and departments have appetites that seldom are satisfied. It is a tendency to find more and more ways of adding to the "public welfare." Most of those who propose additional and enlarged functions are sincere and really believe their proposals are a necessity; they fail to see that in their proposals lies the seed of destruction of free enterprise. Others, of course, are merely personally ambitious.

Here is a case directly in point. There is a beating of the tom-toms now for the immediate establishment of an industry to produce synthetic motor fuels and other products customarily made from petroleum. Two cabinet members have spoken out for such a development. One of them was specific as to costs . . . something on the order of $9 billion. It is represented as a government-supported program. Seldom does government "support" without dominating. Leaving out of the question the necessities of such program . . . and there is by no means substantial agreement on that point with the proponents . . . it could be the start of government operations in petroleum. Various ways have been tried to get government in. There was the War Petroleum Corporation



One of these gas lift bellows has been subjected to 5,000 psi. pressure for 28 times . . .

Can you guess which?*

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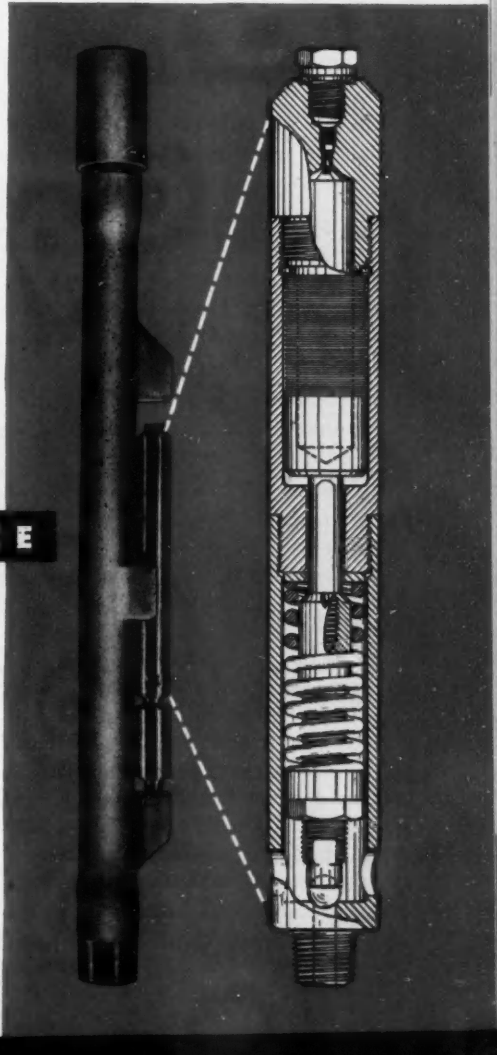

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** Bellows at left was subjected to 5,000 psi. hydraulic test pressure for 28 times with 450 psi. internal bellows pressure.*

proposal in 1942. Later on, the attempt to buy out the companies operating in Saudi Arabia and Kuwait and still later the proposal to finance a pipe line across Saudi Arabia and on to the Mediterranean. All these were turned back before they cost anything. There was the Canol affair which should be used as the scarecrow to frighten off the proposals to put government into the oil business.

Perhaps this session of the Congress will have to pass on this latest proposal to put public money into industry on a grand scale. The concrete proposal with respect to synthetics is to continue the present program of research and pilot-plant operation, now conducted by the Bureau of Mines. The petroleum industry, I believe, looks upon this program with favor generally. It will continue to favor it so long as it is kept in present channels. But the proposal of a huge commercial development illustrates well the common failing of departments. Each step calls for a longer step and they annually come back to the Congress for a higher pair of stilts so the steps can be lengthened.

In the foregoing comment on the synthetics proposals I do not mean to imply that this is the most important question of a petroleum nature that is before the present Congress. I do consider it symptomatic of the thinking that leads to higher and ever higher flights of budgetary fancy. This, in turn, has imposed upon the 80th Congress in its final weeks a task that is certain to use up much of the time.

Aid to Europe

The so-called Marshall Plan, not yet a plan by any means, is another which has added greatly to the congressional burden. The details of the original proposal by the 16 European nations have pretty generally been made available to the oil industry, also the several reports which have been made by committees and agencies in the U. S. The desires of the 16 nations for everything were on the grand scale and the estimates were whittled down by the Harriman committee, composed chiefly of business men and industrialists, and by the Herter committee of the House of Representatives. They are still high, both as to volume of petroleum to be supplied, and petroleum equipment. I will venture a cautious guess that the Congress will set up some definite restrictions as to the export of petroleum from the U. S. to Europe and that it may have a word to say about the supplying of equipment. It was evident in the 16-nation plan that there was an ambition to expand the oil producing and refining industries of those countries materially. A considerable quantity of the supplies was to be devoted to wildcatting.

Cooperatives Studied

There is added, therefore, to the fiscal problems troubling us domestically the international question of whom to relieve and by how much. To provide the Congress with plenty of questions of this character there is the income tax reduction bill, which should be fairly well advanced so far as the Congress is concerned by the time this is printed, and a later general revenue bill which may contain some items of interest to the petroleum industry. The proposal probably will be made to reduce or remove the federal excise tax of 1.5 cents per gallon on gasoline. It is now nearly certain, to judge from public reports, that some attention will be given to the tax privileges enjoyed by cooperatives. It was one thing when years ago the Congress sought to encourage cooperative selling of farm products and cooperative buying of supplies by farmers, as farm relief measures, but it is quite another when manufacturing establishments are established with easy government credit and immunity from federal income taxes as their foundations. The House Small Business Committee has been diligent in recent months in assembling the evidence. As the petroleum industry has at least its due share of competition from cooperative associations, the question will be followed with close interest by those who still have to do commercial banking and pay income taxes.

Tidelands Question

Two questions which have the promise of consideration in this session are the so-called tidelands matter and the Moore-Rizley bill to amend the Natural Gas Act. These are questions of immediate concern to oil men and to the states. It is my hope that the 80th Congress will deal decisively with both.

The tidelands question is one that has made its appearance on several occasions over the past ten years. The decision of the Supreme Court in 1947 in the case of the U. S. against the State of California would be cause for grave concern even though confined to that state. It is regarded as a prelude to similar suits against any other states possessing anything that might be considered on some pretext or other as necessary to national defense. The next moves might be made against those states which have tidelands that are oil-bearing, or imminently possible of producing oil. Texas and Louisiana probably have priority in this respect; Alabama, Mississippi and Florida next. It is not considered, however, that petroleum alone would constitute the basis of attempted federal seizure.

The 80th Congress has this question to consider. The 79th Congress acted on the matter by passing a "quit-claim" resolution, but it was vetoed by President Truman. The Senate Judiciary Committee, acting through a subcommittee, set February 23 as the date to begin hearings on a bill introduced by Senator E. H. Moore of Oklahoma for himself and 19 other senators. The number of sponsors was imposing but of greater significance was the fact that political party lines were not observed. There was an equal division of Republicans and Democrats. The bill differed from the previous declarations as to traditional state ownership. It took into account the conclusions expressed by the Supreme Court. It has the endorsement of the National Association of Attorneys General. That association has established a Washington office.

A similar bill has been introduced in the House, as well as numerous bills of the general style that was vetoed in 1946. The Judiciary Committee of the House contemplated holding its hearings at about the same time Senate hearings were under way, for the convenience of witnesses.

As this question, fundamentally, concerns the integrity of the states, the campaign for action by the Congress is being conducted by the officials of the states . . . the governors and the attorneys general. The oil industry is, however, keenly concerned in the outcome. Should the decision of the court be permitted to be final, there would be an overturning of property rights, possibly a general eviction of those who had made their investments and conducted development under permission from the states. There would be a new "landlord," less experienced and unlikely to acquire the art of property management, as is usually the case with absentee landlords. Over and beyond the question of development and utilization, however, is the far more important one of the weakening of governmental structure itself.

Natural Gas Legislation

The Natural Gas Act amendments embodied in the Moore-Rizley bill have already passed the House. The Senate Committee on Interstate and Foreign Commerce was to hold hearings early in February, a few days away from the time this is being written. Of primary interest to producers is the question of regulation of the production and gathering of natural gas and the elements of Federal Power Commission regulation which go into the makeup of price paid to producers. The producing industry is united in supporting the proposed amendments. All the principal associations of oil and natural gas producers have endorsed the bill and have sponsored the

■ CONTINUED ON PAGE 104

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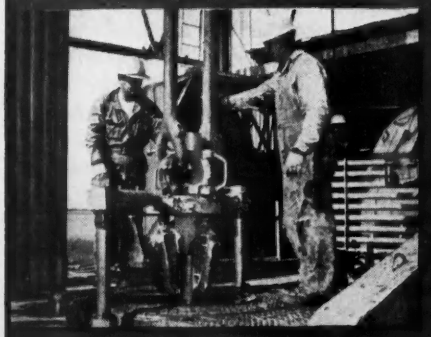
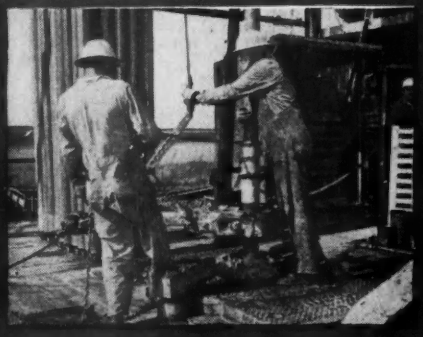


DeCo Slips in up position ready to be set into rotary table.



Slips go into the down position with an easy non-crushing grip . . . the pipe is in the same low position as when using hand slips while the next joint is made up or broken out with rig tongs.

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Federal Control Threatens Oil Industry

By FRANK CARLSON,
Governor of Kansas

AS THE oil industry enters a new year it is faced with one of the stiffest fights of its existence as it braces to combat the selfish efforts of federal bureaus, agencies and individuals to impose governmental control. Currently, the oil industry is operating under partial controls which have been reflected in industry-wide operations. Dangerous trends are apparent in the nation's capital where certain congressmen are prepared to vote restraints and it is obvious that the courts are ready to uphold the constitutionality of such action as evidenced by the recent decisions in the tide lands litigation.

Despite the agitation for federal control of the oil industry, public opinion has not as yet crystalized behind the efforts of its proponents. However, a severe shortage of petroleum products this winter could furnish the necessary public support for congressional action —the support for which certain government bureaus, agencies and individuals are striving.

Diverting for the moment in retrospect, let us compare some facts of past and present. One industry accusation embodies lack of progressive enterprise. Approximately 100 years ago, Samuel M. Kier developed the first process for purification of crude petroleum. At that time, the only oil available was from oil seeps. Today, the consumer demand on petroleum refineries approximates 5¼ million barrels daily. Except for emergency controls during wartime, this industry development took place without the hampering influence of federal control. Lack of progress, they say? The refining process established by Samuel Kier marked the beginning of one of the greatest research and development programs ever established by any American industry, an industry which is spending in excess of $50 million annually on research alone; an industry which in approximately 100 years has developed refining processes to standardized perfection, not to mention development of more than 5400 petroleum by-products which add to the comfort, convenience and materially assist in maintaining America's high standard of living.

Steel Shortage Handicap

The industry is making a determined effort to enlarge its present production, refining and pipe line capacities to meet the increased consumer demand. This determined effort is reflected in the planned development program which is to cost in excess of $4 billion in 1947-1948. But one of the factors which is seriously hampering this tremendous expansion is the severe shortage of steel to the domestic industry, The industry is being asked to produce one-third more petroleum with virtually the same amount of steel as was available in prewar years. It is estimated that the 1947 well completions should have been 40,000, yet our well drilling program provided less than 35,000 during the year. Why? Steel production of tubular goods was expected to be up some 300,000 tons in 1947, yet the domestic petroleum industry was allotted less than that additional tonnage because various governmental departments, for either political or strategic reasons, designated and allotted 85 percent more steel for export than in previous years. It is worthy of mention that the amount of steel required by domestic production to meet the rising demand has been exported under government agency sanction in the past several years to countries in which American nationals hold very little oil interests. How can such shipments be reconciled in the light of the present situation?

I have called attention to the fact that a severe shortage of petroleum this winter could spark public opinion and result in congressional action. Facts available regarding proven reserves do not justify any scarcity of crude, but the continuing shortage of steel necessary to expand producing, refining and pipe line facilities, not to mention the tank car shortage, may well result in an oil shortage of sizeable proportions. Continuing governmental intrusion, especially with export allotments, may well lay the ground work for an ever-rising public sentiment. There are indications from Washington that the export program is at last under close scrutiny and some relief might result from the individual license application program; however, events of the future can only answer this in its entirety. Certainly the industry and the American public are entitled to a clearer picture of this export situation, and it is a challenge to the industry to obtain this clarification of governmental policy and make it known to the public. It is a challenge to the industry to place the facts before the public to restrain rising sentiment.

The difficulty which the industry is experiencing in meeting demand with present equipment and steel supply makes it a vulnerable target for investigations by politically-minded committees with no more constructive thought in mind than "vote getting." The industry is being subjected to a grand jury investigation on "price fixing" with the possible anti-trust suits in the offing. The Senate is investigating the industry to determine if discrimination is being practiced against small business. It seems unlikely that the former investigation can result in any net benefit to the American public, for the industry always has been and is today engaged in active competition to market its products. An industry composed of some 34,000 companies, employing 1¼ million people, can hardly be classified categorically as a monopolistic industry and it is not likely that any abnormal price fixing charges could be substantiated. In the case of discrimination against certain small businesses it has already been brought out that discrimination as such is not being practiced, but that due to the supply limitations, certain markets are not available to these

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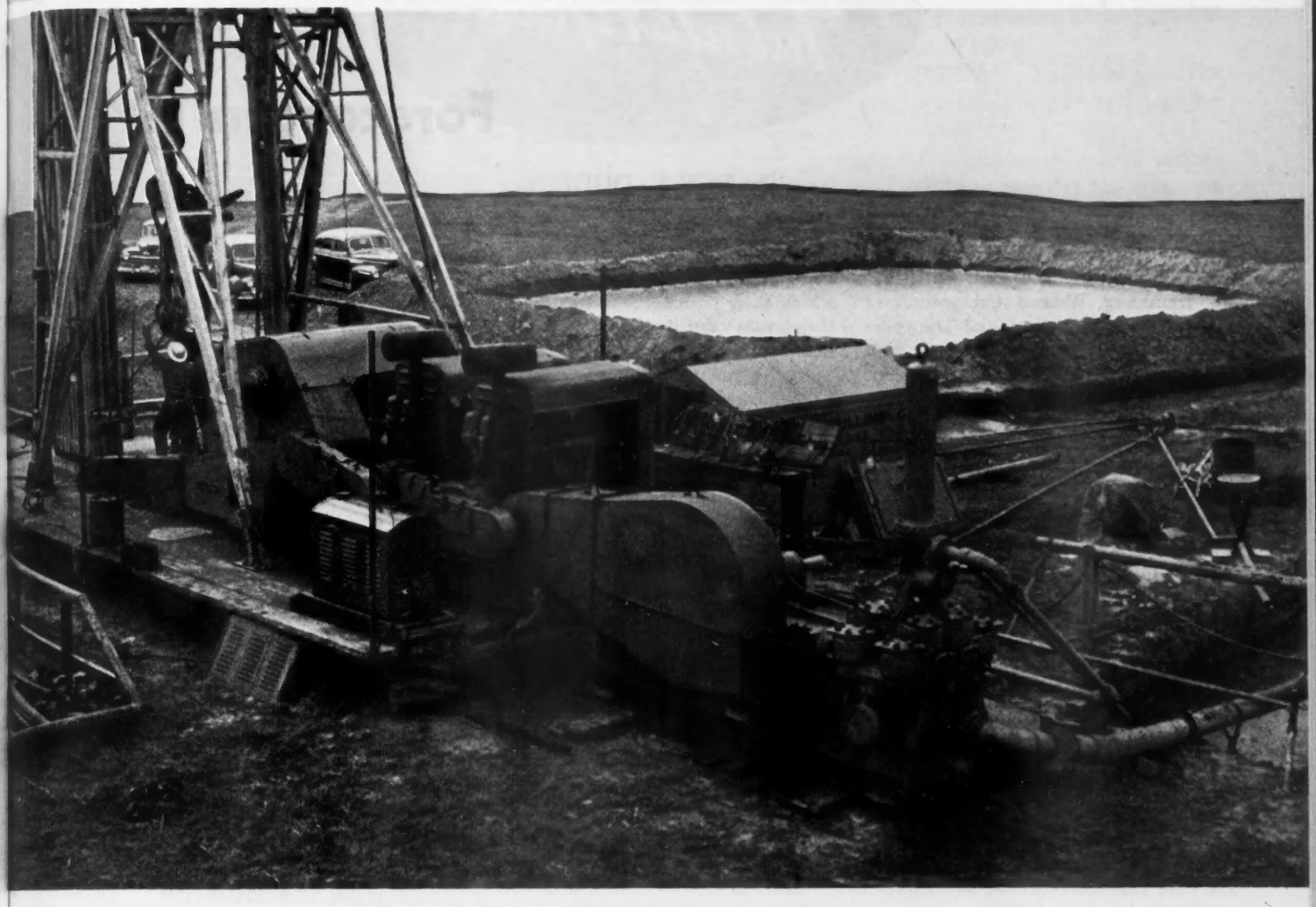
is Portability PLUS



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5 Percent More *Tubular Goods* Forecast in 1948

By RAY L. DUDLEY
Publisher

STICKING our neck out, with fear and trembling, WORLD OIL estimates that, barring labor, fuel and transportation troubles, the steel industry will supply approximately 4 to 5 percent more casing and tubing in 1948 than in 1947. This is somewhat less than we would have forecast three months ago.

Strikes in the steel mills, on railroads, on oreship lines, in the coal mines, gas shortages of an unusual nature—ALL can combine to knock the foregoing estimate into a cocked hat. On the other hand, improvements in the scrap situation over that we have figured *could add* to the tubular goods tonnage produced during the year. And any government directive which might turn more pipe to the oil fields could also increase the tonnage, though not very much, in our opinion.

In making the forecast of a probable tubular goods supply of 4 to 5 percent more than in 1947, we have checked with the sales departments of the various pipe companies. Some are running at 100 percent of their finishing capacity. Some are not, because of lack of steel which in turn is caused in part by the scrap situation. None seems too optimistic over the possibility of increased steel tonnage this year through the use of oxygen in steel making. (Some large oxygen plants are being planned or constructed for such usage and they could have some effect toward the latter part of the year, we think. This is not an expert opinion!)

The reason for the estimate of a slight increase in tonnage for the year is that there has been some addition to capacity, and there have been some improvements in technique which full production makes possible. The mills actually are doing some better than they thought they could a year ago.

Overestimates Shunned

Most of the men with whom we have checked are gun shy of overestimating their possibilities. We sensed some of them have an idea that they would be laying up trouble for themselves with specific customers if they were caught being optimistic. And with the grief which their customers have poured into their ears during 1947, nobody can blame them!

At this point we think a word should be said for the tubular goods companies. We think they did a good job in 1947, and that much of the complaint voiced by some oil men was not justified. The steel companies are in exactly the same shape as the oil industry; the demand has been so great that the facilities for processing have not been adequate. We do not believe the steel companies as such have engaged in the "black market." We have heard complaints that some were at least engaging in a "gray market" but when we have run the story down, as we have on more than one occasion, we found that the pipe company had not been guilty itself of unethical practice, although the original purchaser of the pipe from the mill (and in one instance six consecutive brokers), took a toll not included in the original price.

There doesn't seem to be a shortage of steel insofar as oil drilling and production equipment generally is concerned, aside from tubular goods. Alloy steels seem fairly abundant. (In fact of recent weeks there have appeared advertisements from alloy steel companies calling attention to the ample supply of such steels.) On the other hand the petroleum refining business is having difficulty in getting delivery on refining equipment because steel supply for *that* seems to be in the same category on deliveries as pipe.

Insufficient Line Pipe

Line pipe will be in great demand and in scant supply during the year. However, almost every possible scheme is being used to increase the supply of line pipe, the schemes being developed by the buyer. Billets are being bought by oil companies and sent to other points for rolling into sheets. These sheets are then shipped to still other points for conversion into line pipe.

The final cost of line pipe so made is, of course, much higher than the price quoted by mills engaged in manufacturing line pipe, but there is no hint of "gray market" here because the oil companies are taking the initiative in the matter. There will be some addition to line pipe output during the year, which, however, will not make a great dent in the demand. But every little bit helps.

In securing the basic information on which this forecast is based we pledged our word that no one of the pipe mill officials would be quoted.

We hope that our estimate will prove conservative. Last year, in January, we checked with the pipe companies, just as we have done this year, and based upon what they said, we made an estimate on the number of wells which could be drilled with the pipe in sight. That estimate proved 1.53 percent too low, which shows that the pipe companies gave us pretty straight information and that they made good on what they said they thought they could do.

Legislative Outlook

■ CONTINUED FROM PAGE 98

appearance of witnesses in the hearings in 1947. All who felt an interest in the issue have been fully informed at all stages of the legislative progress. It is greatly to be hoped that the action can be completed before the adjournment of the Congress.

To relegate the question of controls to the later part of this discussion is not to minimize the importance of that issue. There are several proposals before Congress now, ranging from a practical replica of OPA with a dash of WPB thrown in, to control bills which would affect only specified commodities. There is Administration insistance on legislation to control prices, allocate materials and ration commodities, such authority to be exercised at the direction of the Chief Executive.

We have on hand, then, the renewal of the fight which occurred in 1946 when a desperate fight was put on by the several administrators to continue their organizations. At the moment there seem to be no signs that many in the Congress are impressed with the cure-all powers

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The ATLAS Gun has a relatively small diameter, 3⅝ inches, and, therefore, can be used safely in all casings from 5 inches OD up. It is, however, a very powerful gun. Controlled tests under pressure and temperature show penetration of three casings or better.

The regular ATLAS Gun is a **45-shot** gun. For large operations, the number of shots can be increased to 63 per run.

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of control measures. I fully expect, however, that the insistence on legislation will continue right up to adjournment. There are always some who have faith in the "hair of the dog" remedy for the hangover.

Disagreement On Job

Within our industry there has existed for some months a serious disagreement as to the means of doing the job which we all agree must be done. That is the making certain of a plentiful supply of petroleum products for our people and the assurance of adequate producible reserves to meet any emergency demands. Such a condition, for instance, as we had in 1941, should prevail again. A substantial group of us contend that the way to achieve this happy situation is to find and develop reserves in the U. S., well beyond the reach of submarines or any brand of politics except the domestic varieties. There are others who contend that great emphasis should be placed on the development of foreign reserves and the importation of petroleum into our markets in greater quantity. The latter theory has much greater acceptance in the executive branch of the government than in the Congress.

The controversy narrowed to the quite practical matter of supply of tubular goods. Here, again, government is divided. Congressional committees have spoken against the large and increasing exports of these materials while the domestic industry was in want. The Executive Department, which has done much to stimulate such exports, insists that its course is correct.

I am hopeful that a practical solution can be reached through the medium of machinery created pursuant to the anti-inflation bill passed in December. It should properly be a matter for the petroleum and the steel industries to settle. I feel certain that the independent producers have no wish to stop foreign development. They realize that the U. S. cannot supply the world with oil, nor should it attempt the job. They merely contend that the interests of the U. S. should be first served and that the most certain way to achieve this result is to put first emphasis on exploration and development here at home.

The practical solution would be to make enough tubular goods so that both domestic and foreign development could be carried on to the reasonable satisfaction of all concerned. It would not require an inordinate diversion from the amount of total steel produced and it would give a priority consideration to an industry which, from every standpoint of public welfare, is now at the stage of requiring such consideration.

Steel Problem Tackled

The committee appointed by the chairman of the National Petroleum Council has begun its work on this steel problem. I am very hopeful that a sound solution of the problem can be reached without bringing the matter further to the attention of an already overburdened Congress.

At the outset I disclaimed the role of prophet. I have the feeling that there will at least be consideration, if not settlement, by the Congress of those subjects which entered specifically into this discussion. There are many others which have application to the oil industry, directly or secondarily, but in view of the tremendous legislative program which the Congress will try to dispose of in the next five months, it seems probable that many questions will await the coming of the next Congress.

Federal Control

■ CONTINUED FROM PAGE 100

small businesses as has been the case in prior years. This latter investigation, however, has materially assisted in bringing the acute teel shortage and steel export situations out into the open.

Government experts are now contemplating a revision of the tax laws. The proposed revision includes, among other things, a five-year carry-forward of business losses in place of a two-year carry-forward as is in existence now. This matter is of considerable importance to the oil industry, for the administrative treatment of losses has a definite bearing on capital available for exploration of undeveloped potential oil areas. The policy decided upon for treatment of business losses and other pertinent tax problems should be such that development and exploration can be encouraged by ready capital and the industry be unhampered in its course of development and expansion to meet the domestic demands.

Much has recently been written regarding exports and imports of petroleum and its products. Certainly the premise of priority of domestic producer to supply domestic demand should govern policy in both phases.

In still another field there is considerable confusion and governmental control implications; I refer to natural gas. The Federal Power Commission issued a statement of policy and rules in August disclaiming jurisdiction over production and gathering. The statement of policy on its surface appears to support the claims of the Rizley-Moore Bill, yet this same statement of policy is particularly evasive in its language and contains provisions which are controversial. Also of importance is the fact that the courts have interpreted the Natural Gas Act to give authority to the FPC over production and gathering. Since the FPC retains jurisdiction over the parties and findings, it is only a discretionary matter of majority opinion to change the statement of policy once again to include the full authority authorized under the court's interpretation. Many members of the industry are not satisfied with this attempt by the FPC to solve the confusion. The natural gas industry is expanding with extraordinary demands by domestic and industrial consumers and this expansion need not be hampered by Federal control imposed locally by discretionary governmental agencies superseding sovereign rights of states.

In order to maintain a program of exploration and exploratory work, it is necessary that a fair price for crude, its products, and for natural gas be maintained. There is no doubt that most, if not all, of the known surface geological structures have been developed and while there remains many very productive areas and possibly larger oil and gas fields than have yet been discovered, the geological and geophysical development will be costly; therefore, a fair price for petroleum and its products is necessary.

The petroleum industry has developed from a minute embryo to a multi-billion dollar progressive, competitive, well-balanced, sound American industry in less than 100 years, and has undergone this development unhampered by federal government participation, either directly or indirectly. Unless the underlying, undercover forces being exerted now to impose federal control are halted, the industry may soon find itself in the unenviable position wherein its progress can be materially retarded by politically minded bureaus and agencies and hounded by governmental red tape.

The prosperity of the industry depends upon the will of the people, and at no time in the history of this industry has it been so important to assure the people that the industry is doing all in its province to supply demand; to demonstrate the causes of supply shortage; to inform and keep the people informed of past, present and proposed future operations and progress, thereby forestalling the assembly of forces necessary to impose governmental regulation.

34,811 New U. S. Wells in 1948 Is Drilling Forecast

By RAY L. DUDLEY
Publisher

and

ELTON STERRETT
Engineering Editor

NEW Wells drilled in the U. S. during 1948 will total 34,811, an increase of 5.5 percent over the 1947 total. Of these, 6014 wells will be exploratory tests, seeking new fields, new pays and extensions to existing proven areas. The remainder will be proven area tests or wells for water or gas input in secondary recovery operations or as disposal wells. These figures are the result of WORLD OIL's annual survey of oil companies, regional engineers, geologists and state control boards in each of the areas where oil is now produced or where exploratory activity is under way.

Extent of the increase of drilling in 1948 over 1947 is predicated largely on the ability of the industry to obtain tubular goods. This factor, hampering drilling more than any other scarcity in the 1947 program looms as the most serious again in 1948, with most drilling budgets tailored to fit the anticipated maximum pipe deliveries as outlined by pipe producers. If tubular goods are available in excess of the 4 to 5 percent increase predicted over 1947 figures, drilling also will increase over the forecast. Likewise, if labor conditions, failure of the tubular goods manufacturers to attain their goal, and other factors reduce the tonnage of pipe expected, the drilling total will decrease proportionately.

Effect of tubular goods stringency is evident in the plans for 1948 drilling. The industry is staking its effort in areas where the greatest number of barrels of oil may be anticipated per ton of pipe steel. Closely correlated with the number of wells is the anticipated footage to be drilled, which is up to 119,357,000 feet, against last year's 112,748,844 for an increase of 5.8 percent. The change in footage ranges from plus 41.2 percent in Texas District 3 (Upper Gulf), to minus 19.1 in Mississippi.

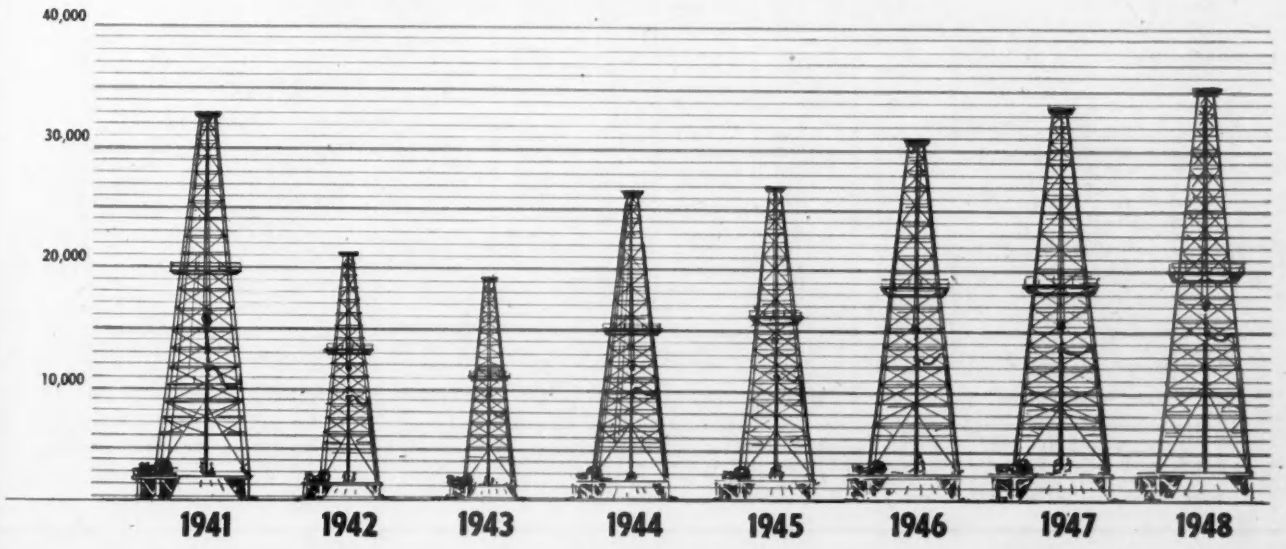
The forecast is based on returns from oil companies, estimates of anticipated tubular goods supplies, probable available drilling equipment, consideration of deliverability of additional oil from each area—as represented by augmented pipe line or other transportation facilities—and the demand for the type of crude to be expected, and other data amassed by the editorial staff of WORLD OIL. It is, of necessity, based on factors as they appeared during the first month of 1948, and figures cited would be subject to revision upward or downward, depending upon the effect of changed conditions on the factors of demand, labor, tubular goods and transportation.

Equipment Survey

The changeover from wartime scarcity on most important drilling items has now been accomplished and manufacturers during 1947 were in position to take care of orders with prompt deliveries. WORLD OIL during January, at the request of manufacturers, conducted a survey on 1947 deliveries on several important items of drilling equipment. Complete cooperation was had on most of the items surveyed. In some others, the figures are not yet completed with breakdown into the various classes or capacities of the items being surveyed.

It was found, for instance, that 283,026 feet of drill collars were delivered during the past year, of which approximately 12 percent was in sizes up to

Drilling Trends and Forecast, 1941-48



and including 5 inches outside diameter; 58 percent was from 5¼ inches to 6¾ inches OD, and the remaining 30 percent in sizes above 6¾ inches.

Crown blocks delivered in sizes or capacities ranging from 75 tons to maximum totalled 235, of which 78 were from 75 to 150 tons, 84 from 150 to 300 tons, and 73 above 300 tons.

There were delivered 330 drawworks in sizes from small rig equipment up to those capable of handling drilling to 5000 feet. Probably half of this number would be rated as capable of going to 5000 feet. On sizes used in usual drilling operations from 5000 to 12,000 feet, 298 were delivered. There were 61 "deep hole" or ultra heavy drawworks delivered during the year.

Light rotaries amounted to 330. This figure included 118 very light rigs and 215 capable under favorable conditions of carrying hole to 5000 feet. Heavier rotaries delivered, ranging from those ordinarily used for drilling below 5000 feet and including the heaviest rigs, totalled 515.

Against the showing made by the equipment manufacturers last year, as evidenced by deliveries actually made, there is expression of additional capacity for 1948 which will assure the industry of the major items of equipment required to meet the demands of an augmented program. On the equipment delivered last year, no segregation of items intended for replacement, as against that for new rigs, was attempted. Since only manufacturers were contacted in this survey, no consideration is accorded items of equipment already in stock in supply stores or in company warehouses, as this is a fluid item which would equalize over the year until such time as production of equipment outdistanced the demand in active operations.

On a percentage basis, drilling is indicated to increase in all but ten of the areas considered, the decrease ranging from the greatest drop in Mississippi of 24.8 percent to practical parity in Ohio with a decrease of only 0.1 percent. The ten areas presenting decreases in estimated drilling for 1948 incorporate 20 percent of the entire footage to be drilled, and 30 percent of the wells indicated to be drilled. Excluding Ohio from these figures, the areas showing for indicated reductions are but 26.5 percent of the total wells to be drilled. On the same basis, the footage for areas with reduced estimated quotas then becomes only 17.4 percent. Thus it appears that using either method of determining activity, approximately three-fourths of the entire U. S. oil area will see drilling at a rate equal to or greater than that of 1947, with the decreases marked for those areas where the shortage of tubular goods and/or relatively small oil return per ton of steel indicate curtailment to be advisable or at best the least damaging.

Texas Prospects

Texas indicates the greatest number of wells to be drilled with 10,676, which is or 30.7 percent of the total indicated for the U. S. The increase over 1947 drilling is 15 percent, and ranges within the state from the 60.7 increase forecast in District 7-C to even parity in District 1. This latter area, along with District 6 (Northeast Texas), show as the only sections of the state in which augmented activity is not indicated. On the basis of anticipated footage to be drilled, the

Indicated Number of Wells and Footage to Be Drilled in 1948

Forecast covers all new wells to be drilled for oil or gas in 1948, salt-water disposal wells, and water or gas-input wells for repressuring and secondary recovery, but does not estimate old wells drilled deeper.

STATE OR DISTRICT	TOTAL WELLS			EXPLORATORY TEST COMPLETIONS		FOOTAGE[1]			
	Actual New Wells, 1947	New Wells Forecast, 1948	Percent Change	Forecast, 1948	Percent of New Wells, 1948	Drilled, 1947	To Be Drilled, 1948	Percent Change From 1947	Percent of U.S. Total
Alabama	30	27	—10.0	25	92.6	132,921	124,000	—11.4	0.001
Arkansas	326	300	— 8.0	80	26.7	1,342,204	1,229,000	— 8.4	1.030
California	1,955	2,166	+10.8	282	13.0	8,091,796	8,963,000	+ 9.7	7.509
Colorado	209	170	—18.7	38	22.4	1,159,840	967,000	—16.6	0.810
Florida	29	32	+10.3	29	90.6	152,945	174,000	+13.8	0.001
Illinois	2,046	1,955	— 4.4	574	29.4	5,286,749	5,116,000	— 3.2	4.286
Indiana	627	614	— 2.0	153	24.9	1,113,684	1,106,000	— 2.8	0.927
Kansas	2,581	2,615	+ 1.3	475	18.2	8,392,535	8,631,000	+ 2.8	7.231
Kentucky	861	806	— 6.4	143	17.7	1,671,347	1,403,000	— 1.6	1.175
Louisiana	1,659	2,036	+22.7	411	20.2	8,722,670	9,677,000	+10.9	8.108
North Louisiana	1,019	1,286	+26.2	217	16.9	3,051,257	3,164,000	+ 3.7	2.651
South Louisiana	640	750	+17.2	194	25.9	5,671,413	6,513,000	+14.8	5.457
Michigan	716	735	+ 2.7	265	36.1	1,661,428	1,759,000	+ 5.9	1.474
Mississippi	468	375	—24.8	103	27.5	3,940,776	3,188,000	—19.1	2.671
Montana	239	280	+17.2	30	10.7	551,883	681,000	+23.4	0.571
New Mexico	561	593	+ 5.7	84	14.2	2,421,211	2,710,000	+ 1.2	2.270
New York	1,863	1,750	— 6.1	25	1.4	2,642,763	2,490,000	— 5.8	2.086
Ohio	1,322	1,320	— 0.1	65	4.9	3,741,300	3,090,000	— 1.7	2.589
Oklahoma	3,588	3,762	+19.7	663	17.6	11,358,936	11,991,000	+ 5.6	10.046
Pennsylvania	3,449	3,233	— 6.3	10	0.3	5,998,032	5,200,000	— 1.8	4.357
Texas	9,281	10,676	+15.0	2,316	21.7	40,680,963	47,412,000	+16.5	39.725
Dist. 1: South Central	366	366	0.0	150	41.0	1,305,789	1,353,000	+ 0.4	1.134
Dist. 2: Middle Gulf	620	750	+21.0	218	29.1	3,786,963	4,541,000	+19.9	3.805
Dist. 3: Upper Gulf	872	1,299	+49.0	328	25.3	5,626,086	7,944,000	+41.2	6.656
Dist. 4: L. Gulf-S. West	1,109	1,274	+14.9	406	31.9	6,934,443	6,798,000	— 2.0	5.696
Dist. 5: East Central	166	196	+18.1	90	45.9	819,750	970,000	+18.3	0.813
Dist. 6: Northeast	488	490	+ 0.4	80	16.3	2,530,080	2,336,000	— 0.8	1.957
Dist. 7-B: North Central	888	957	+ 7.8	351	36.7	2,736,022	2,958,000	+ 8.1	2.478
Dist. 7-C: West Central	275	442	+60.7	86	19.5	967,817	1,512,000	+56.2	1.267
Dist. 8: West	1,952	2,210	+13.2	210	9.5	9,651,362	10,949,000	+13.4	9.173
Dist. 9: North	2,007	2,090	+ 4.1	368	17.6	5,400,986	5,873,000	+ 8.8	4.921
Dist. 10: Panhandle	538	602	+11.9	29	1.5	1,921,665	2,178,000	+13.3	1.825
West Virginia	845	900	+ 6.5	50	5.6	2,365,094	2,661,000	+12.5	2.233
Wyoming	260	360	+38.5	113	31.4	1,186,637	1,595,000	+34.4	1.336
Other States[2]	79	106	+34.2	80	75.5	133,130	190,000	+42.9	0.002
Total United States	32,995	34,811	+ 5.5	6,014	17.3	112,748,844	119,357,000	+ 5.8	100.000

[1] Footage drilled in 1947 and footage forecast for 1948 include that for new wells seeking production and for input or disposal purposes but does not include footage of old wells drilled deeper in 1947 nor that footage expected to be added by drilling old wells deeper in 1948.
[2] Other States include: Arizona, Georgia, Idaho, Iowa, Maryland, Missouri, Nebraska, North Carolina, Oregon, South Dakota, Tennessee, Utah, Virginia, and Washington. All percentages are computed to the nearest significant figure.

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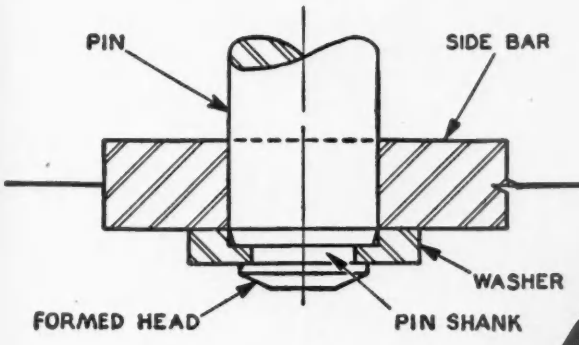

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increase is even greater than in the number of wells, being 16.5 against 15 percent. Here, again, District 7-C shows the highest percentage of change, with Districts 4 and 6 (Lower Gulf, Southwest and Northeast Texas) indicating slight decreases in footage. The areas in which decreased footage is indicated represent 19.3 percent of the state's total. The remaining four-fifths of the footage are well distributed among the other areas, with the exception of District 1, South Central, where the change is nominal against parity in drilling figures for the past and forthcoming years.

A column has been added this year to the tabulation of indicated numbers of wells and footage to be drilled. This column, setting forth the percent of footage drilled by each area as against the total for the U. S., indicates the relative importance of each area as considered in the light of probable demand for tubular goods and equipment. Here it appears that two states, Texas and Oklahoma, will account for almost one-half of the entire footage to be drilled during 1948. Only three other states, Louisiana, California and Kansas, in that order, represent more than 5 percent each of the anticipated footage to be drilled. Pennsylvania, with 4.4 percent, and Illinois, with 4.3 of the total, are the only other states to indicate a footage percentage above 3 percent. They also are the only states in the high percentage bracket to show a decrease over last year's total drilling figures.

In some of the areas there is a wide range between the percentage of wells to be drilled and the footage indicated. In the Upper Gulf area of Texas, (District 3) for instance, there is a spread of 7.2 in the percentage indicated for wells and footage, the difference being reflected in the average depth of drilling anticipated for 1948, as indicated by the trend toward shallower drilling in 1947, discovery of shallower pays, and the consequent reduction in the number of relatively deep exploratory tests. Where development of shallower pays eliminates or reduces the penetration of zones requiring intensive protective methods, the saving in pipe alone is frequently the deciding factor in favor of the shallower well, and under such conditions a decided decrease in average penetration may show in the projected figures.

Other than the areas in which shallow production has operated to reduce the average depth, areas which show little increase in number of wells forecast may mark up appreciable gains due to the change in average through the development of relatively deep production as a consequence of successful deep wildcatting during 1947.

Predicated on present pipe, labor and regulatory conditions, the oil industry plans to drill 6014 exploratory wells during the year. This total includes strict wildcats, wells drilled from grass roots in search of new pays, even though the holes may penetrate already known production at shallower depths, and what prove to be extension wells, as distinct from offset or normal drilling for definition of a field. This figure of over 6000 wells is approximately 9 percent above the actual drilling of exploratory tests during 1947, and reflects the desire of the industry to develop new reserves. As last year, 1948 should see more tests in states which lie outside of presently known producing areas, with a continuation of drilling forecast by the companies reporting in Idaho, Oregon and Washington, as well as in states along the Lower Atlantic Seaboard.

Exploratory Percentage

The percentage of exploratory tests scheduled for 1948 is 17.3. This compares with 16.6 percent of last year's drilling, computed on exploratory wells of the same classes for both periods. The figures do not include old wells, even though killed or on abandoned status, which are drilled deeper in seeking production.

Texas, with 2316 exploratory wells indicated for 1948, leads all the states with 38.5 percent of the total wildcat wells to be drilled during the year. Although District 5 (East Central), indicates the highest percentage of exploratory tests with 45.9, District 4 (Lower Gulf Southwest), leads the remainder of the state with 406 projected exploratory tests. North Texas, District 9, with 368; North Central Texas, District 7-B, with 351; and Upper Gulf, District 3, with 328, together account for more than another 1000 test wells in the state. Only the Panhandle (District 10), with 29 exploratory tests indicated out of a total of 602 wells predicted, falls appreciably below 10 percent exploration activity, the entire state showing 21.7 percent of all wells indicated to be drilled listed in the exploratory wells column.

Michigan, although upping the projected total only 2.7 percent over 1947 figures, takes second place in the percentage column, with an indicated total of 265 exploratory tests giving the state a rating of 36.1 percent.

Wyoming, scheduling 113 exploratory wells out of a total of 360 predicted for 1948, takes third place with a percentage of 31.4, both wildcatting and proven drilling being stepped up sharply for the year.

Illinois, with 29.4 percent; Mississippi, with 27.5; Arkansas, with 26.7; Indiana, with 24.9; Colorado, with 22.4; and Louisiana (combined areas) with 20.2, complete the roster of states which plan to put more than one fifth of all wells drilled within the year into the exploration column.

Three other states, Kansas, Kentucky and Oklahoma, crowd close to the top nine with exploration well percentages of 18.2, 17.7 and 17.6, respectively. New Mexico, California and Montana, with 14.2, 13.0 and 10.7 percent, respectively, complete the list of states in which more than one-tenth of all projected drilling is indicated as exploratory. Most of the states listed as ranking high on a basis of projected explorations also indicate high footage totals. This would indicate that the tubular goods requirements of these states would fall below the total which would be required with higher percentages of proven field drilling, as the expenditure of pipe steel per foot of wildcat is much less than in a completed, producing well, due to the salvage factor when dry wildcats are pulled and most of the pipe is salvaged for further drilling use. Survey results indicate that only because of this high exploratory test figure can the total drilling indicated for the year exceed the anticipated production of tubular goods during the year.

The figure by which estimated total footage drilled exceeds the anticipated deliveries of pipe is approximately that by which the exploratory well percentage exceeds that of 1947, leaving to the industry the problem of finding only the relatively slight spread between projected operations and expected tubular goods. This problem will be intensified if any of the disturbing factors included in the survey assumes importance greater than assigned it in the first-of-the-year evaluation for purposes of this survey; likewise, if conditions should be bettered, the industry should be able to concentrate more effectively on the task of proving up more reserves, and augmenting the number of wells which will meet the country's demand for greater production.

Editorial Index to 1947 Issues Now Available

The complete editorial index covering all issues of *The Oil Weekly* and WORLD OIL published during 1947 has been prepared and is bound separately in convenient pamphlet form. It will be sent without charge, of course, to all subscribers who need and request copies.

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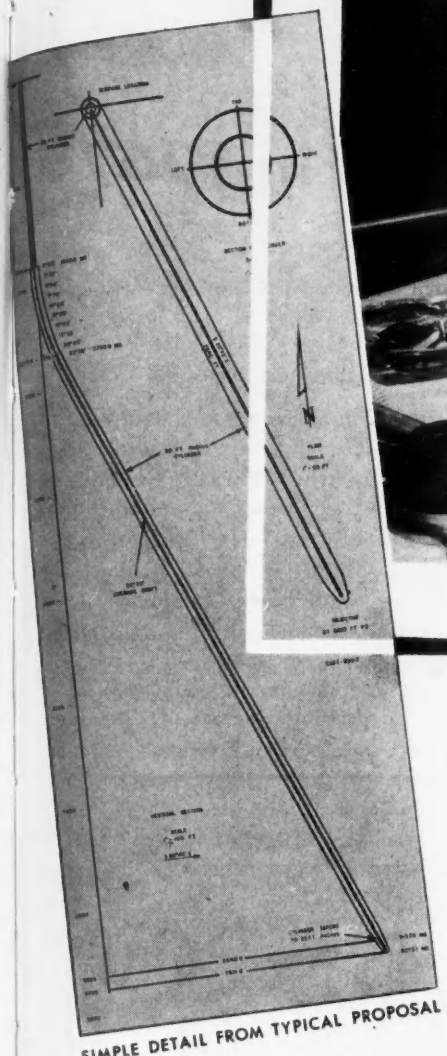

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Well Completions and Footage Make Sharp Gains in 1947

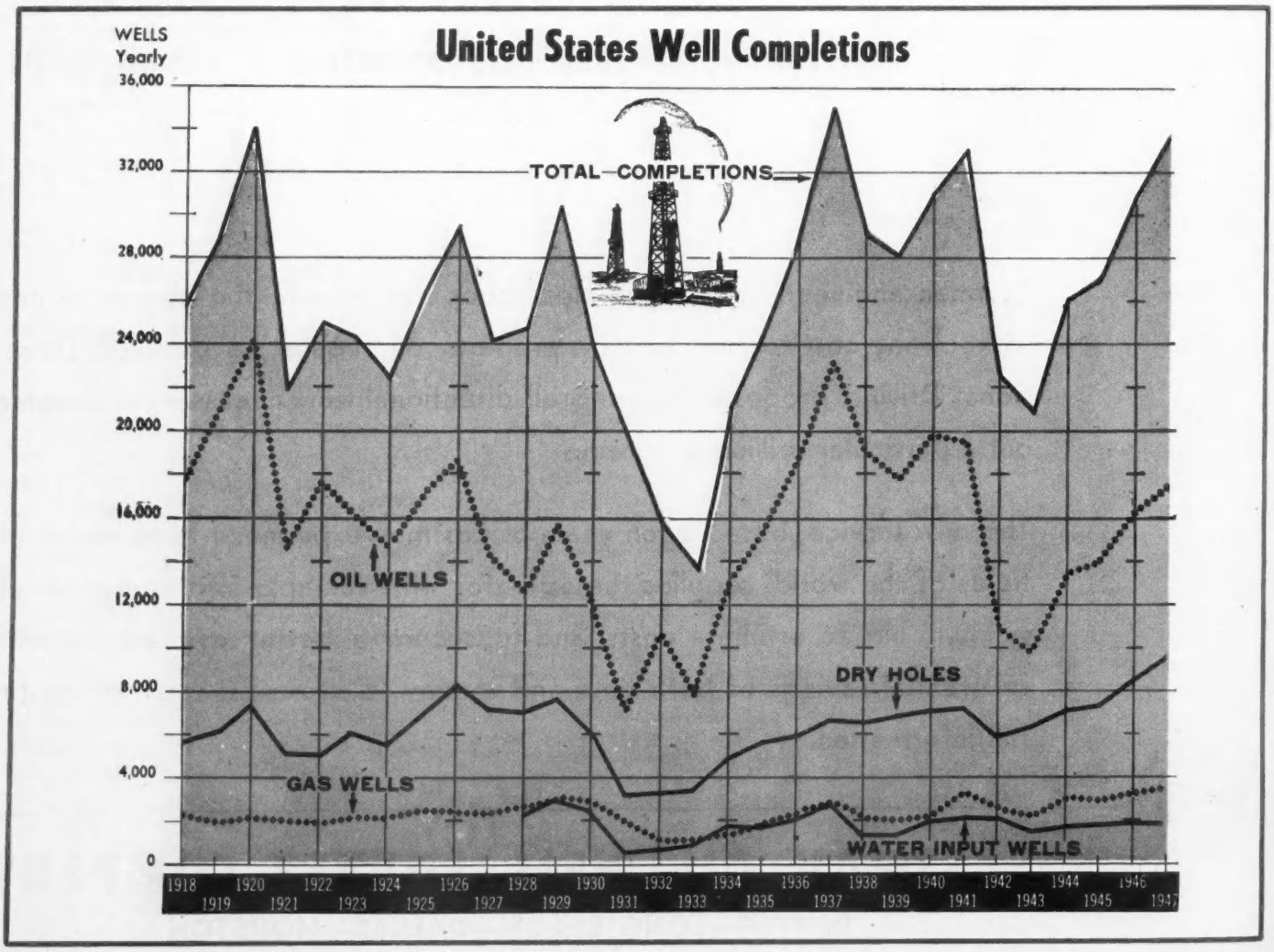
A SHARP rise in drilling rates boosted U. S. well completions in 1947 to near an all-time high, and resulted in the drilling of the greatest amount of footage in any year in history.

A total of 33,646 wells of all kinds was completed in the nation last year, an increase of 2801 wells and 9 percent more than the 30,845 completed in 1946. Total completions were the third greatest in history, and the largest number since 1937 when a record of 35,213 wells was established.

The increase in number of wells completed, aided by a gain in depths to which wells were drilled, resulted in footage involved in 1947 completions climbing to an all-time peak of 113,212,166 feet. Exclusive of the relatively small amount of footage drilled in deepening of old wells, the amount of footage drilled last year totaled 112,748,844 feet, up 11.5 percent from the preceding year. This was 11½ million feet more than in 1946 and almost 7¾ million feet more than the previous peak of 105,099,189 feet involved in the 35,213 wells completed in 1937. The average depth of wells increased to the second highest level in history, averaging 3417 feet in contrast with 3345 feet in 1946 and 2985 feet in 1937. The deepest average depth ever recorded in any year is the 3489 feet per well attained in 1945.

Subnormal Rate

Due to inability to obtain sufficient steel, a subnormal number of wells in relationship to production rates has been drilled each year since 1941, and this trend continued last year despite the increase in drilling achieved. Although 1800 more wells were completed in 1947 than the annual average of 31,169 completions for the five prewar years (1937-1941), this constituted a gain of less than 6 percent, whereas production



during the same period had risen 43 percent.

During the prewar period, an average of 24.2 wells were completed for every million barrels of crude oil produced. This dropped to 15.1 new wells per million barrels during the war years (1942-1945), and recovered to only 17.4 new completions for every million barrels produced in 1946. Despite the gain in number of wells drilled during 1947, only 17.8 new wells were completed for each million barrels of crude oil produced.

The 33,646 wells completed last year were made up of 30,833 new wells seeking oil or gas production, 1799 input wells, 317 gas input wells, 46 salt water disposal wells, and 651 old wells drilled deeper. This was in contrast with the completion during 1946 of 28,145 new wells seeking oil and gas production, 1816 water input wells, 219 gas input wells, 50 salt water disposal wells, and 615 old wells drilled deeper. Whereas total completions were up 9 percent, the number of new wells seeking production rose 9.6 percent; water input wells declined 0.9 percent; gas input wells increased 44.7 percent; salt water disposal wells decreased by 8.0 percent; and old wells deepened was up 5.9 percent.

Further Increase Expected

A further increase in drilling and footage seems certain in 1948. A survey of operators indicates that, exclusive of old wells drilled deeper, 34,811 wells will be drilled in the U. S. during 1948, an increase of 5.5 percent over the 1947 total. (See story on page 109.)

Of the 30,833 new wells drilled in search of production last year, 21,297, or 69 percent, were productive. These consisted of 17,478 oil producers, 283 distillate wells and 3526 gas-producing wells. Thus, 57 percent of the producers found oil, 11 percent discovered gas, and 1 percent, distillate. In contrast with the 9.6 percent increase in number of wells seeking production, the number completed as oil wells rose but 8.6 percent, while there was a gain of 5.1 percent in gas wells, and a 36.7 percent increase in distillate producing completions.

Dry holes drilled during 1947 set a new high, the figure of 9546 topping the previous record of 8496 failures completed in 1946. This was an increase of 12.4 percent. The proportion of the wells seeking production which failed to do so amounted to 31 percent, an increase of less than 1 percent when compared with the ratio of 1946.

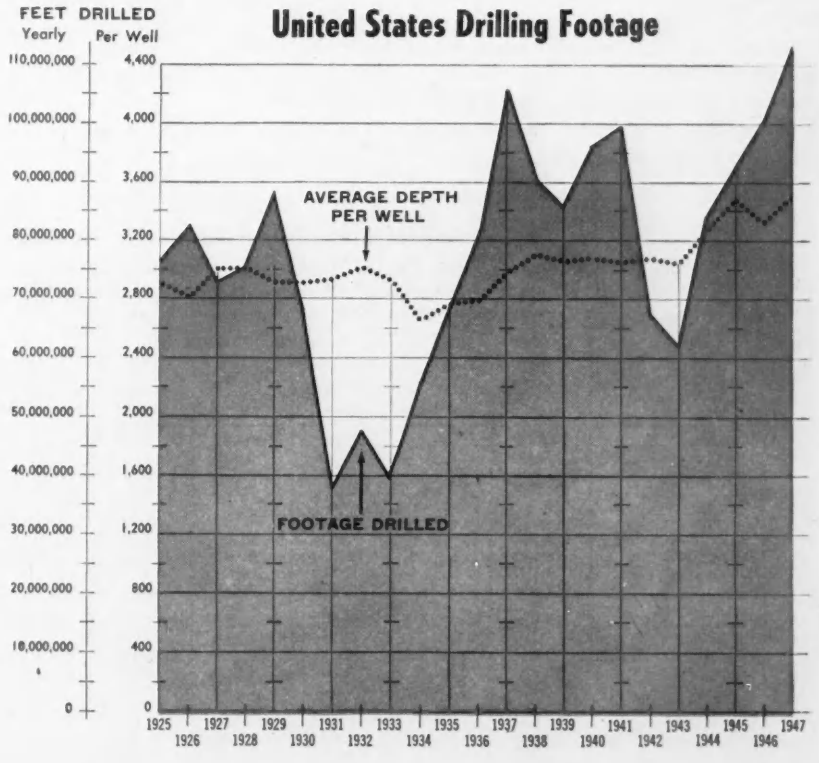
The oil wells completed in the U. S. last year had an average depth of 3593 feet. As to be expected, distillate producing wells had the highest average depth with 8552 feet per well. The average depth of all gas well completions was 3049 feet, while dry holes averaged 3497 feet per well.

Although drilling tests were completed in 29 of the 48 states, the seven states of California, Illinois, Kansas, Louisiana, Oklahoma, Pennsylvania and Texas accounted for three-fourths of all completions. Only other states to complete 1000 wells were New York and Ohio.

Texas led all states in total number of wells completed, with 9518 wells, or more than one-fourth of all completions in the nation. Texas' drilling activity represented an increase of 13.6 percent over the 8382 wells completed in 1946. This state also accounted for the most footage, the aggregate depth of its completions totaled 40,848,821 feet for an average depth of 4292 feet per well. This was almost 5 million more feet than was drilled in the state in 1946, when the state recorded an average depth of 4286 feet per well. More than one-third of all the footage drilled in the U. S. was in Texas.

Oklahoma completed both the second largest number of completions and amount of footage drilled. This state had 3707 completions, up 20.5 percent from the 3301 wells finished in 1946. The state's footage rose less sharply, amounting to 11,406,612 feet in contrast with 10,201,937 feet in the preceding year, as its average depth of completions dropped from 3091 feet in 1946 to 3077 feet last year. The combined footage of Texas and Oklahoma was nearly half of the nation's total.

Despite a decrease of 5.3 percent in completions, Pennsylvania finished the third largest number of wells. There were 3488 wells completed in the state as compared with 3685 in 1946. Many of the wells were water input and gas input wells, accounting for 1065 of the nation's 1799 water input wells, and 285 of the 317 gas input wells drilled in the country. Pennsylvania's wells are completed at very shallow depths, the state averaging but 1733 feet per well last year, and



YEAR	New Wells Completed	Footage Drilled	Average Depth per Well	YEAR	New Wells Completed	Footage Drilled	Average Depth per Well
1925....	26,412	76,594,800	2900	1936....	28,962	80,996,816	2797
1926....	29,456	82,476,800	2800	1937....	35,213	105,099,189	2985
1927....	24,089	72,267,000	3000	1938....	29,127	90,585,158	3110
1928....	24,765	74,295,000	3000	1939....	28,012	85,523,094	3053
1929....	30,363	88,052,700	2900	1940....	31,149	96,182,605	3088
1930....	23,711	68,761,900	2900	1941....	32,510	99,347,714	3056
1931....	12,959	37,892,116	2924	1942....	21,990	67,903,053	3088
1932....	15,836	47,682,196	3011	1943....	20,349	61,991,857	3046
1933....	13,523	39,568,298	2926	1944....	25,786	84,378,457	3272
1934....	21,122	56,141,433	2658	1945....	26,649	92,982,113	3489
1935....	24,851	67,844,939	2760	1946....	30,230	101,124,813	3345
				1947....	32,995	112,748,844	3417

Data for Old Wells Drilled Deeper not included in above statistics. Source: Records of THE OIL WEEKLY and WORLD OIL.

hence only 6,045,000 feet were involved in the rather larger number of completions.

The fourth most active drilling state was Kansas, where 2650 wells were completed, an increase of 19.3 percent over the 2221 completions of 1946. The state also ranked fourth in footage drilled, its total of 8,410,058 feet being equivalent to an average depth of 3174 feet per well.

Next to Texas and Oklahoma from the standpoint of footage was Louisiana, due to having a very high average depth per completion. Although its 1667 completions was good for only eighth position among the states in activity, total footage involved in Louisiana's completions was 8,737,091 feet. Average depth of completions was 5241 feet, highest of all the more active states. The southern part of the state had an especially high average depth per well with 8809 feet for 644 wells. North Louisiana brought the state average down, wells in this region having an average depth of only 2995 feet.

Mississippi had the sharpest increase in number of completions and also recorded the greatest average depth for its completions. A total of 470 tests was completed in 1947, an increase of 76.7 percent over the 263 completions of 1946. The average depth of Mississippi completions was 8388 feet per well. The state had the highest average completion depth in 1947 also, with 7345 feet per well.

The sharpest decrease in completion rates occurred in Illinois. There were 316 or 13.3 percent fewer tests completed in the state last year than in 1946, the total being 2063 against 2379. Other states to complete fewer wells were Kentucky, Michigan, Montana and Pennsylvania.

California, the second largest producing state, showed an increase below the national average despite the heavy drain being made on its reserves. The completion of 1983 tests in the state during 1947 represented a gain of but 4.5 percent, or 86 wells, over 1946.

West Texas Increase

Much of the increased drilling in Texas ocurred in the West Texas region. This area, comprised of Districts 7-C and 8, completed a total of 2330 wells against 1870 in the preceding year, a gain of 24 percent. North and North Central Texas was the most active district in the state, the 2969 completions here, however, was only slightly more than the 2958 completed in 1946. The Lower Gulf Coast region (District 4) experienced a sizable decrease in activity, recording the completions of only 1137 wells against 1605 in the previous year. Northeast Texas (District 6) also completed fewer wells, finishing 493 in contract with 718.

Sizable decreases in average depths per well to which the bit penetrated were accounted for by the following states: Colorado, down to 5512 against 6338 feet; Florida, averaging 5274 feet per well against 6607; Georgia, down from 4221 to 3754 feet; Louisiana down in 1947 to 4241 compared with 6162 feet; and Montana, with an average of 2285 feet per well in contrast with 2371.

On the other side of the record were the following increases in average depth per well: Alabama, up to 4431 feet per well against 4081; Arkansas, up from 3916 to 4071 feet; Illinois with 2566 feet per well compared with an average of 2500 in 1946; Kansas with 3174 feet per well against 3116; Kentucky up from 1797 to 1936 feet; Michigan with 2315 compared with 2238; Mississippi with 8388 feet in 1947 in contrast with 7345; Nebraska with 2662 against 2560; New Mexico with 4140 against 3805 feet in the preceding 12 months; North Carolina with 6370 feet in contrast with 5235 feet; Ohio with 2792 feet compared with 2570 feet; Tennessee with 1579 against 965; Utah with 5039 compared with 2367; Washington with 7660 last year and 6230 in 1946; and Wyoming up from 4164 to 4442 feet.

Wells Completed Annually in United States

(Source: WORLD OIL and predecessor, The Oil Weekly, with aid of other authoritative sources, 1921 to now; 1920 and earlier years from U. S. Bureau of Mines and Petroleum in the United States and Possessions, by Arnold and Kemnitzer)

	NEW WELLS									
YEAR	Oil	Distillate	Gas	Dry	Water Input	Gas Injection	Salt Water Disposal	Total New Wells	Old Wells Drilled Deeper	Total Completions
1859–1917	380,502	....	20,183	91,821	.....	....	....	492,506	....	492,506
1918	17,860	....	2,324	5,629	.....	....	....	25,813	....	25,813
1919	21,041	....	2,153	6,075	.....	....	....	29,269	....	29,269
1920	24,278	....	2,275	7,476	.....	....	....	34,029	....	34,029
1921	14,715	....	2,081	5,193	.....	....	....	21,989	....	21,989
1922	17,790	....	1,926	5,191	.....	....	....	24,907	....	24,907
1923	16,182	....	2,140	6,043	.....	....	....	24,365	....	24,365
1924	14,707	....	2,172	5,591	.....	....	....	22,470	....	22,470
1925	17,029	....	2,536	6,847	.....	....	....	26,412	....	26,412
1926	18,626	....	2,502	8,328	.....	....	....	29,456	....	29,456
1927	14,382	....	2,494	7,213	.....	....	....	24,089	....	24,089
*1928	12,505	....	2,754	7,164	2,342	....	....	24,765	....	24,765
*1929	15,758	....	3,107	7,600	3,898	....	....	30,363	....	30,363
*1930	12,133	....	2,971	6,163	2,444	....	....	23,711	....	23,711
*1931	7,061	....	2,067	3,264	567	....	....	12,959	....	12,959
*1932	10,569	....	1,079	3,389	799	....	....	15,836	....	15,836
*1933	7,887	....	1,190	3,492	954	....	....	13,523	....	13,523
1934	13,119	....	1,496	4,811	1,696	....	....	21,122	....	21,122
1935	15,418	....	1,802	5,696	1,665	....	....	24,581	....	24,581
1936	18,704	....	2,375	5,787	2,096	....	....	28,962	....	28,962
*1937	23,115	....	2,732	6,627	2,739	....	....	35,213	....	35,213
1938	19,106	....	2,143	6,515	1,363	....	....	29,127	....	29,127
1939	17,734	....	2,030	6,890	1,358	....	....	28,012	....	28,012
1940	19,843	....	2,265	7,053	1,988	....	....	31,149	....	31,149
1941	19,590	....	3,279	7,280	2,197	117	47	32,510	822	33,332
1942	10,977	105	2,685	5,962	2,141	73	47	21,990	588	22,578
1943	9,887	76	2,314	6,364	1,576	90	42	20,349	471	20,820
1944	13,502	54	3,024	7,153	1,784	218	51	25,786	377	26,163
1945	13,944	153	3,039	7,346	1,796	329	42	26,649	491	27,140
*1946	16,087	207	3,355	8,496	1,816	219	50	30,230	615	30,845
†1947	17,478	283	3,526	9,546	1,799	317	46	32,995	651	33,646
Total	851,529	878	92,019	282,005	37,018	1,363	325	1,265,137	4,015	1,269,152

* Data for year revised to include some wells not embodied in corresponding table published in THE OIL WEEKLY of February 10, 1947.
† Data for 1947 subject to slight revision.

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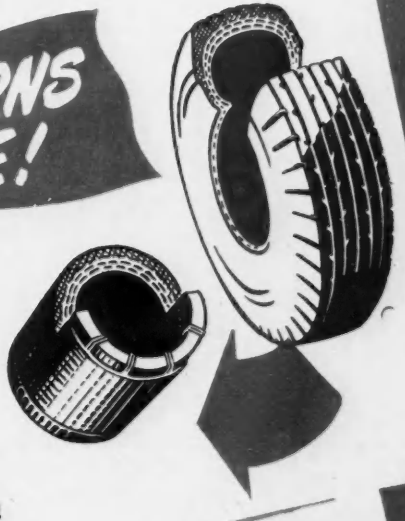

American's exclusive design of this packing element takes full advantage of modern tire fabrication principles. Sketches at right show the great similarity of cut-away portions of both cup and tire . . . shows how both are constructed of alternating layers of rubber . . . with fabric cut and placed on the bias! This feature, exclusive with American, enables element to readily return to original shape!

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Wells Completed and Footage and Average Depths Drilled in the United States in 1947

STATE OR DISTRICT	OIL			DISTILLATE			GAS			DRY			WATER INPUT			GAS INPUT		
	Wells	Footage	Avg. Depth	Wells	Footage	Avg. Depth	Wells	Footage	Avg. Depth	Wells	Footage	Avg. Depth	Wells	Footage	Avg. Depth	Wells	Footage	Avg. Depth
Alabama	6	20,596	3433							24	112,325	4680						
Arkansas	174	716,453	4118	4	30,421	7605	7	25,568	3653	141	569,762	4041						
California	1554	6,400,996	4119				46	177,003	3848	355	1,513,797	4264						
Colorado	156	994,338	6374				8	16,366	2046	45	149,136	3314						
Florida	2	23,151	11576							27	129,794	4807						
Georgia										5	18,770	3754						
Illinois	1071	2,852,077	2663				9	13,805	1534	966	2,420,867	2506						
Indiana	291	523,556	1799				26	29,210	1123	310	560,918	1809						
Kansas	1287	4,210,346	3271				436	1,235,344	2833	832	2,856,931	3434				1	3,508	3508
Kentucky	293	491,743	1678				294	621,944	2115	272	552,959	2033						
Louisiana	924	4,404,418	4767	86	814,472	9471	93	355,575	3823	548	3,113,434	5681	1	9,040	9040	1	8,541	8541
North Louisiana	547	1,212,718	2217	31	256,366	8270	83	275,874	3324	352	1,288,673	3661	1	9,040	9040			
South Louisiana	377	3,191,700	8466	55	558,106	10147	10	79,701	7970	196	1,824,761	9310				1	8,541	8541
Michigan	320	790,843	2471				47	83,582	1778	349	787,003	2255						
Mississippi	290	2,569,381	8860	18	149,351	8297	24	194,988	8125	136	1,027,056	7551						
Missouri	7	2,057	294				9	3,039	377	27	17,770	658						
Montana	150	335,539	2237				26	63,170	2430	63	153,174	2431						
Nebraska										3	7,987	2662						
New Mexico	397	1,895,421	4774	1	9,152	9152	61	176,552	2894	102	340,086	3334						
New York	1119	1,546,615	1382				11	42,376	3852	11	46,750	4250	722	1,007,022	1395			
North Carolina										1	6,370	6370						
Ohio	307	713,689	2325				557	1,817,987	3264	458	1,209,624	2641						
Oklahoma	1964	6,280,456	3198	5	29,758	5952	188	593,978	3159	1404	4,407,782	3139				23	36,312	1579
Oregon										1	8,500	8500						
Pennsylvania	1269	2,039,295	1607				602	1,314,107	2183	228	480,580	2108	1065	1,707,195	1603	285	456,855	1603
Tennessee	2	3,065	1533							19	30,096	1584						
Texas	5617	25,047,179	4459	167	1,361,262	8151	487	2,191,210	4499	2984	12,040,744	4035	10	8,515	852	7	15,346	2192
Dist. 1—S. Central	176	768,040	4364				9	42,572	4730	181	495,177	2736						
Dist. 2—Middle Gulf	358	2,173,611	6071	44	334,931	7612	41	213,670	5211	177	1,064,751	6015						
Dist. 3—Upper Gulf	447	2,626,984	5877	63	558,324	8862	42	257,973	6142	320	2,182,805	6821						
Dist. 4—L. Gulf-S.W.	582	3,266,602	5613	45	356,749	7928	62	318,895	5143	419	1,987,963	4745				1	4,234	4234
Dist. 5—East Central	60	341,993	5700	1	5,821	5821	14	102,036	7288	90	365,322	4059						
Dist. 6—Northeast	285	1,332,201	4674	11	92,077	8371	75	497,803	6637	115	602,838	5242						
Dist. 7-B—North Central	385	1,199,673	3116	1	3,750	3750	32	100,593	3144	470	1,432,006	3047						
Dist. 7-C—West Central	202	633,281	3135				4	17,206	4302	69	317,330	4599						
Dist. 8—West	1696	8,395,639	4950				15	52,183	3479	241	1,203,540	4994						
Dist. 9—North	1133	3,270,930	2887	2	9,610	4805	16	50,847	3178	834	2,043,004	2450	10	8,515	852	6	11,112	1852
Dist. 10—Panhandle	293	1,038,225	3543				177	537,432	3036	68	346,008	5088						
Utah										4	20,155	5039						
Washington										2	15,321	7660						
West Virginia	108	192,446	1782				582	1,717,721	2951	154	451,723	2933	1	3,204	3204			
Wyoming	170	748,112	4401	2	25,755	12877	13	75,579	5814	75	337,191	4496						
Total United States	17,478	62,801,772	3593	283	2,420,171	8552	3526	10,749,104	3049	9546	33,386,605	3497	1799	2,734,976	1520	317	520,562	1642

STATE OR DISTRICT	SALT WATER DISPOSAL			TOTAL NEW WELLS (Preceding Classes)						OLD WELLS DRILLED DEEPER, 1947 (Productive and Dry)			TOTAL ALL WELLS					
				1947			1946						1947			1946		
	Wells	Footage	Avg. Depth	Wells	Footage	Avg. Depth	Wells	Footage	Avg. Depth	Wells	Footage	Avg. Depth	Wells	Footage	Avg. Depth	Wells	Footage	Avg. Depth
Alabama				30	132,921	4431	17	69,381	4081				30	132,921	4431	17	69,381	4081
Arizona							2	6,259	3129							2	6,259	3129
Arkansas				326	1,342,204	4117	201	794,842	3955	4	1,354	338	330	1,343,558	4071	203	795,012	3916
California				1955	8,091,796	4139	1823	7,763,246	4258	28	29,700	1061	1983	8,121,496	4096	1897	7,860,125	4143
Colorado				209	1,159,840	5549	176	1,115,503	6338	2	3,130	1515	211	1,162,970	5512	176	1,115,503	6338
Florida				29	152,945	5274	27	178,378	6606				29	152,945	5274	27	178,378	6607
Georgia				5	18,770	3754	2	8,441	4220				5	18,770	3754	2	8,441	4221
Illinois				2046	5,286 749	2584	2342	5,936,676	2535	17	6,460	380	2063	5,293,209	2566	2379	5,948,579	2500
Indiana				627	1,113,684	1776	512	917,820	1793	4	432	108	631	1,114,116	1766	522	922,836	1768
Kansas	25	86,406	3456	2581	8,392,535	3252	2127	6,900,446	3244	69	17,523	254	2650	8,410,058	3174	2221	6,919,938	3116
Kentucky	2	4,701	2350	861	1,671,347	1941	950	1,713,718	1804	3	1,060	353	864	1,672,407	1936	955	1,715,987	1797
Louisiana	6	17,190	2865	1659	8,722,670	5258	1418	8,755,279	6174	8	14,421	1803	1667	8,737,091	5241	1422	8,762,668	6162
North Louisiana	5	8,586	1717	1019	3,051,257	2994	807	3,247,347	4024	4	12,531	3133	1023	3,063,788	2995	810	3,252,786	4016
South Louisiana	1	8,604	8604	640	5,671,413	8862	611	5,507,932	9015	4	1,890	473	644	5,673,303	8809	612	5,509,882	9003
Maryland							1	7,710	7710							1	7,710	7710
Michigan				716	1,661,428	2320	781	1,753,591	2245	2	760	380	718	1,662,188	2315	785	1,756,718	2238
Mississippi				468	3,940.776	8420	263	1,952,981	7426	2	1,404	702	470	3,942,180	8388	266	1,953,902	7345
Missouri				43	22,866	532	34	27,567	811				43	22,866	532	34	27,567	811
Montana				239	551 883	2309	258	622,433	2413	3	1,058	353	242	552,941	2285	263	623,668	2371
Nebraska				3	7,987	2662	5	12,799	2560				3	7,987	2662	5	12,799	2560
New Mexico				561	2,421,211	4316	442	1,723,189	3899	46	91,805	1996	607	2,513,016	4140	463	1,761,560	3805
New York				1863	2,642,763	1419	1501	2,175,214	1449				1863	2,742,763	1419	1501	2,175,214	1449
North Carolina				1	6,370	6370	5	26,173	5235				1	6,370	6370	5	26,173	5235
Nevada							1	3,750	3750							1	3,750	3750
Ohio				1322	3,741,300	2830	1313	3,398,593	2588	25	19,412	776	1347	3,760,712	2792	1326	3,407,177	2570
Oklahoma	4	10,650	2662	3588	11,358,936	3166	3179	10,157,733	3195	119	47,677	401	3707	11,406,613	3077	3301	10,201,937	3091
Oregon				1	8,500	8500	2	17,148	8574				1	8,500	8500	2	17,148	8574
Pennsylvania				3449	5,998,032	1739	3645	6,322,572	1735	39	46,968	1204	3488	6,045,000	1733	3685	6,363,625	1727
South Dakota							3	8,038	2679							3	8,038	2679
Tennessee				21	33,161	1579	18	17,371	965				21	33,161	1579	18	17,371	965
Texas	9	16,707	1856	9281	40,680,963	4383	8226	35,848,363	4358	237	167,858	708	9518	40,848,821	4292	8382	35,923,614	4286
Dist. 1—S. Central				366	1,305,789	3568	183	667,913	3650	5	2,984	597	371	1,308,773	3528	183	667,913	3650
Dist. 2—Middle Gulf				620	3,786,963	6108	[1]	[1]	[1]	9	17,087	1898	629	3,804,050	6048	[1]	[1]	[1]
Dist. 3—Upper Gulf				872	5,626,086	6452	680	4,910,901	7222	5	6,598	1319	877	5,632,684	6423	680	4,910,901	7222
Dist. 4—L. Gulf-S.W.				1109	5,934,443	5351	1576	8,763,990	5561	28	28,117	1004	1137	5,962,560	5244	1605	8,793,197	5479
Dist. 5—East Central	1	4,578	4578	166	819,750	4938	[2]	[2]	[2]	1	1,425	1425	167	821,175	4917	[2]	[2]	[2]
Dist. 6—Northeast	2	5,161	2580	488	2,530,080	5185	714	3,810,251	5336	5	3,743	749	493	2,533,823	5140	718	3,815,339	5314
Dist. 7-B—N. Central				888	2,736,022	3081	[3]	[3]	[3]	22	19,926	906	910	2,775,948	3029	[3]	[3]	[3]
Dist. 7-C—West Central				275	967,817	3519	[4]	[4]	[4]	13	13,774	1059	288	981,591	3408	[4]	[4]	[4]
Dist. 8—West				1952	9,651,362	4944	1825	9,043,573	4955	90	49,358	548	2042	9,700,720	4751	1870	9,058,755	4844
Dist. 9—North	6	6,968	1161	2007	5,400,986	2691	2908	7,611,271	2617	52	24,278	467	2059	5,425,264	2635	2958	7,634,956	2581
Dist. 10—Panhandle				538	1,921,665	3572	340	1,040,464	3060	7	568	81	545	1,922,233	3527	368	1,042,553	2833
Utah				4	20,155	5039	9	21,303	2367				4	20,155	5039	9	21,303	2367
Virginia							2	5,370	2685							2	5,370	2685
Washington				2	15,321	7660	1	6,230	6230				2	15,321	7660	1	6,230	6220
West Virginia				845	2,365,094	2799	781	2,177,906	2789	35	8,527	244	880	2,373,621	2697	806	2,190,187	2717
Wyoming				260	1,186,637	4564	163	678,790	4164	8	3,773	472	268	1,190,410	4442	163	678,790	4164
Total United States	46	135,654	2949	32,995	112,748,844	3417	30,230	101,124,813	3345	651	463,322	712	33,646	113,212,166	3365	30,845	101,492,958	3290

[1] Dist. 2 included with Dist. 4. [2] Dist. 5 included with Dist. 6. [3] Dist. 7-B included with Dist. 9. [4] Dist. 7-C included with Dist. 8.

FIRST CHOICE OF DRILLERS

In multiple hookups of two, three, four or six engines, Series L Cummins Dependable Diesels are providing the power that enables drillers to obtain fast, low cost footage at the deepest levels ever reached. In the 12 years since the first Cummins Diesels were compounded for oil field use, they have established records of economy, dependability and easy servicing . . . records attested by the fact that Cummins powers more rigs in the Mid-Continent area today than any other diesel.

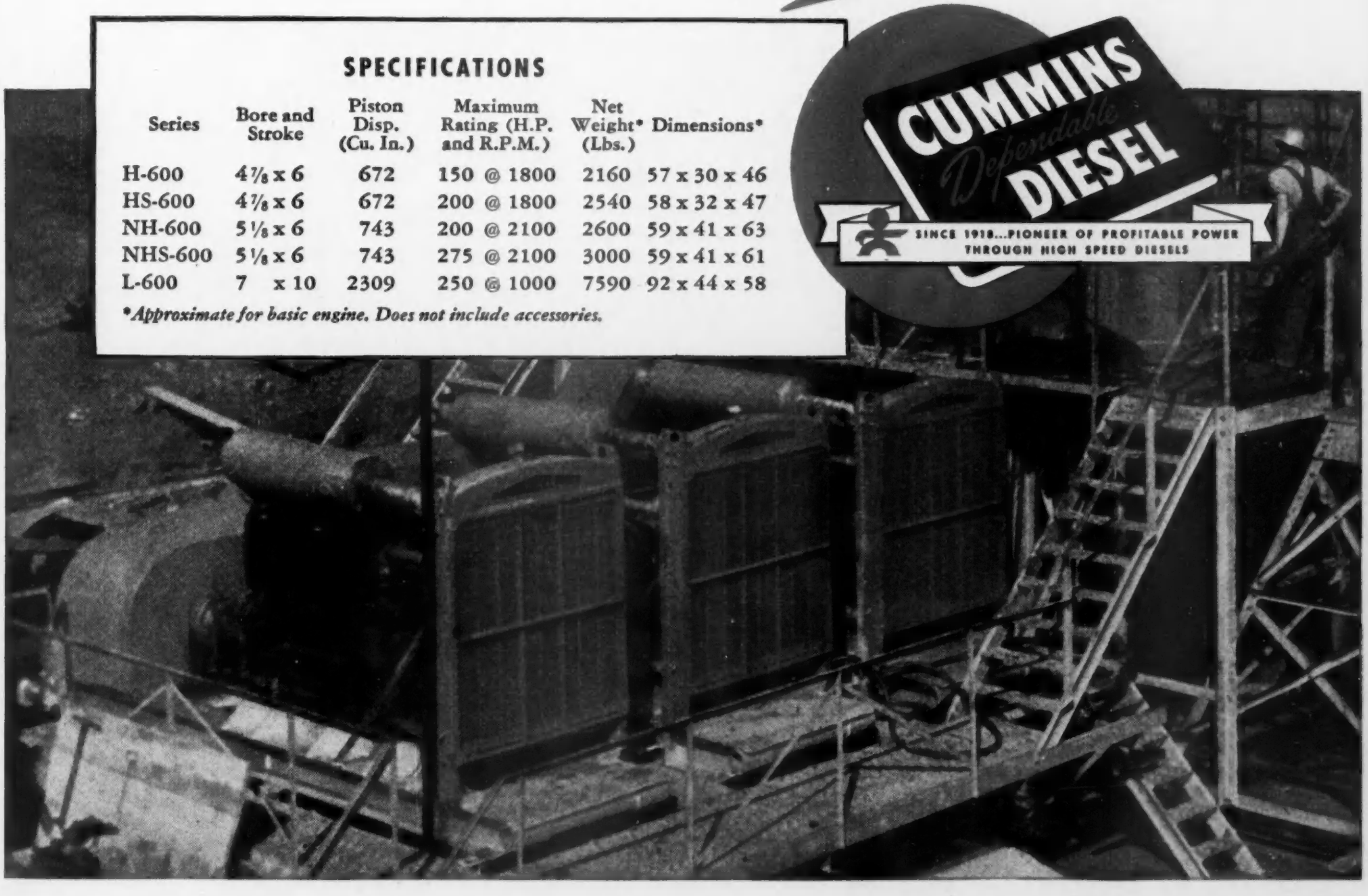
In addition to the Series L, used extensively in compounded rigs, four other series of Cummins Dependable Diesels are designed for heavy-duty jobs of drilling, pumping, generating and well servicing.

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, INDIANA

SPECIFICATIONS

Series	Bore and Stroke	Piston Disp. (Cu. In.)	Maximum Rating (H.P. and R.P.M.)	Net Weight* (Lbs.)	Dimensions*
H-600	4⅞ x 6	672	150 @ 1800	2160	57 x 30 x 46
HS-600	4⅞ x 6	672	200 @ 1800	2540	58 x 32 x 47
NH-600	5⅛ x 6	743	200 @ 2100	2600	59 x 41 x 63
NHS-600	5⅛ x 6	743	275 @ 2100	3000	59 x 41 x 61
L-600	7 x 10	2309	250 @ 1000	7590	92 x 44 x 58

**Approximate for basic engine. Does not include accessories.*



Three Series L Cummins Diesel Engines, rated at 240 hp each at 900 rpm, work as a team in deep hole drilling to produce a total of 720 hp.

Drilling Depth Marks May Fall Again in 1948

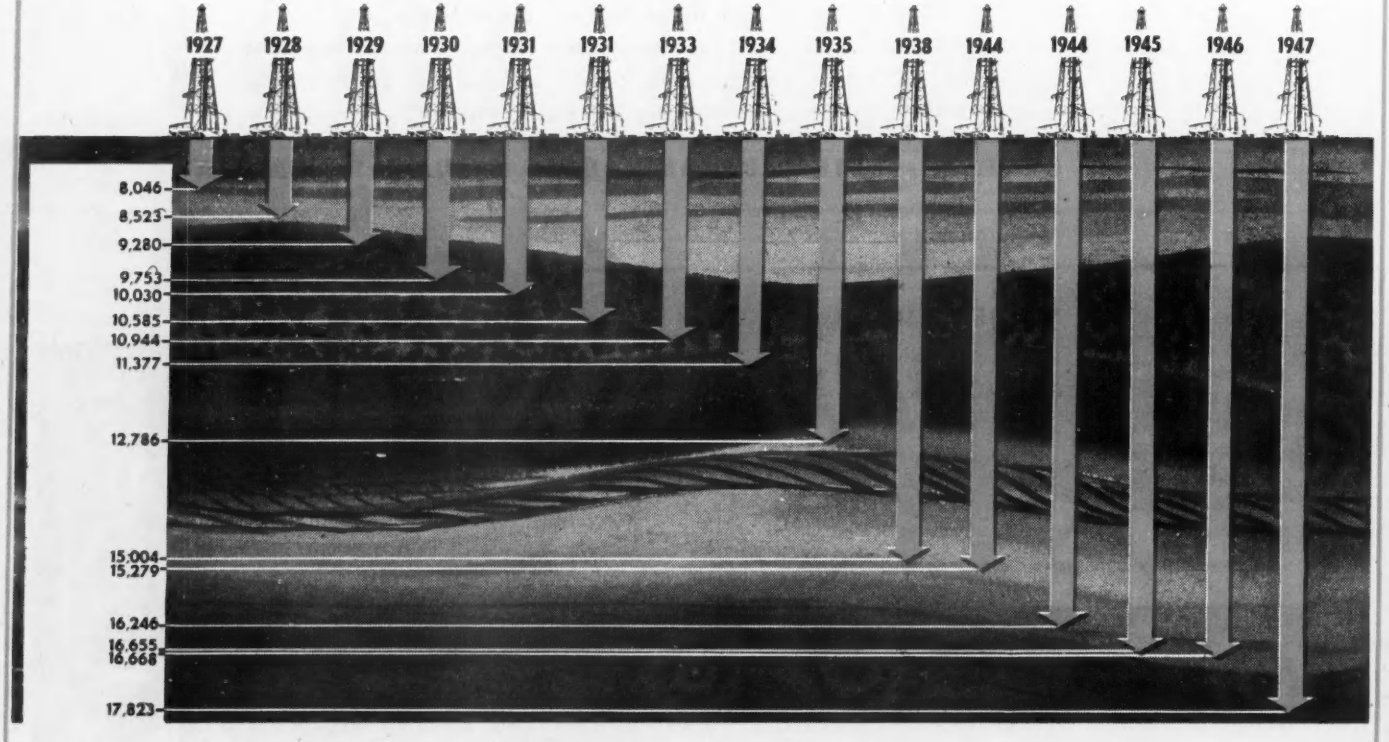
THE world's drilling depth record was again shattered by a substantial margin in the U. S. during 1947. Prospects are favorable for the establishment of another deeper record during 1948. A drilling well currently is very close to the mark.

As operators of the U. S. continued to search deeper and deeper for new petroleum reserves, new drilling depth marks also were established in numerous states.

The previous record for deep drilling was extended by 1155 feet and now is 17,823 feet—almost 3½ miles into the earth. The great progress in drilling technique and equipment during recent years is ably illustrated by the advancement of deep drilling.

The drilling depth record has advanced more in the past 20 years than in the preceding 69 years of the industry's history, the present deepest hole being more than double the 8523-foot record

Record-Breaking Depth Tests Since 1927



(Includes both dry and producing wells)

Year	Well and Location	Feet
1927	Chansler-Canfield-Midway Oil Company's Olinda 96, Olinda, California	8,046
1928	Texon Oil and Land Company's University 1-B, Big Lake, West Texas	8,523
1929	Shell Oil Company's Nesa 1, Long Beach, California	9,280
1930	Standard Oil Company of California's Mascot 1, Midway, California	9,753
1931	Chansler-Canfield-Midway Oil Company's Hobson A-2, Rincon field, Ventura County, California	10,030
1931	Penn-Mex Fuel Company's Jardin 35, State of Vera Cruz, Mexico	10,585
1933	North Kettleman Oil & Gas Company's (later taken over by Union Oil Company) Lillis-Welch 1, Kettleman Hills, Kern County, California	10,944
1934	General Petroleum Corporation's Berry 1, Belridge, Kern County, California	11,377
1935	Gulf Oil Corporation's McElroy 103, Gulf-McElroy, Upton County, West Texas	12,786
1938	Continental Oil Company's KCL A-2, Wasco, Kern County, California	15,004
1944	Phillips Petroleum Company's Ada Price 1, Wildcat Pecos County, West Texas	15,279
1944	Standard Oil Company of California's KCL 20-13, South Coles Levee, Kern County, California	16,246
1945	Phillips Petroleum Company's Shoeps 3, Wildcat, Brazoria County, Gulf Coast, Texas	16,655
1946	Pacific Western Oil Corporation's National Royalties 1, Miramonte area, Kern County, California	16,668
1947	Superior Oil Company of California's Weller 51-11, Wildcat, Caddo County, Oklahoma	17,823

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Drills Holes to 1200 Feet

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Model 300 A
Drills Holes to 4000 Feet

A heavy-weight, portable drilling rig for slim-hole production drilling. A younger brother to the large oil field rotaries; arranged for truck mounting to speed up moves between drilling locations. Operates same as conventional rotary plus added features which include hydraulic make and break tongs. Capacity 50,000 lb. drilling string.

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of 1928. In the past ten years there has been an increase of 3800 feet in the drilling depth mark. It was not until 1944 that the first 16,000-foot test in history was drilled, and already the industry has drilled to nearly 18,000 feet.

Oklahoma Has New Record

Honors for making the greatest penetration into the earth now belong to The Superior Oil Company of California's Weller 51-11, a wildcat test in Caddo County, Oklahoma. The previous record holder, drilled in 1946, was Pacific Western Oil Corporation's National Royalties 1, in Kern County, California. Both of the wells were dry holes.

The well which is challenging the record for the deepest test ever drilled is Standard Oil Company of California's Maxwell 1, in Ventura County California. In early February, it had stuck drill pipe after drilling to 17,696 feet. It already is the deepest ever drilled in California and the second deepest in the world.

Ranking behind Oklahoma and California for deep drilling honors is Texas, which has a state record of 16,655 feet.

Editorial Index to 1947 Issues Now Available

The complete editorial index covering all issues of *The Oil Weekly* and WORLD OIL published during 1947 has been prepared and is bound separately in convenient pamphlet form. It will be sent without charge, of course, to all subscribers who need and request copies.

Requests should be addressed to the Circulation Department, Box 2608, Houston 1, Texas. Please mail requests immediately.

This same well held the world's record at the end of 1945. Although the state record was not broken in 1947, four of this state's oil districts received new marks during the year. First was the Lower Texas Coast district where a test reached 16,006 feet, then came North Texas with a new record of 13,352 feet established, and South Central Texas with a 11,951-foot mark, followed by the Panhandle which received a 11,737-foot operation.

Only in Oklahoma, California and Texas has any test drilled past the 16,000-foot mark.

Eleven states received deeper drilling during 1947 than they had ever had before. Outside of Oklahoma and California with their previously discussed super-deep tests, came these states with new records: Mississippi with a new mark of 15,730 feet; Louisiana, 15,730 feet; Florida, 15,455; Wyoming, 13,063; Utah, 12,146; Washington, 11,002; Michigan, 10,665; Kansas, 8243; and Tennessee, 5750. The Utah and Michigan tests were still drilling at the end of 1947.

There now are 19 states in which at least one 10,000-foot or deeper test has been drilled, two more than in 1946. The states in which first 10,000-foot tests were drilled during 1947 were Utah and Washington, both rank wildcat oil exploratory regions. Some states, notably Louisiana, Texas, California and Oklahoma, of course, have been the site of numerous deep drilling operations.

With the exception of a few scattered areas, all states have received new deep drilling records since 1943.

Drilling Depth Records in U. S., by States and Districts

State or District	Feet	Year	Formation	Well, Location and Remarks
Oklahoma	17,823	1947	Pennsylvanian	Superior Oil Company of California's Weller 51-11, Caddo County. World's deepest.
California	17,696	1947	.....	Standard Oil Company of California's Maxwell 1, Sect 23-2n-23w, Ventura County. Still Drilling.
Upper Texas Coast	16,655	1945	L. Cretaceous	Phillips Petroleum Company's Schoeps 3, Millican salt dome area, Brazos County.
Lower Texas Coast	16,006	1947	Frio	The Texas Company's Yturria L & L Co. 6, Raymonville area, Willacy County.
Mississippi	15,730	1947	.....	Superior Oil Company of California's Cassie Bradford 1, Sect. 1-3n-13w, Forrest County.
South Louisiana	15,523	1947	Miocene	The Texas Company's LaFourche Basin Levee District 1, Queen Bess Island field, Jefferson Parish.
Florida	15,455	1947	.....	Gulf Refining Company's State of Florida 1, Big Pine Key area, Monroe County.
Southwest Texas	15,301	1045	L. Cretaceous	Quintana Petroleum Company's South Texas Syndicate 3-D, McMullen County.
West Texas	15,279	1944	Ellenburger	Phillips Petroleum Company's Ada Price 1, T. C. Railway survey, Pecos County.
New Mexico	13,998	1945	Ordovician	Phillips Petroleum Company's State-Lea-Mex. 4, Maljamar area, Lea County.
East Texas	13,781	1946	Cotton Valley	Phillips Petroleum Company's Englander 1, Don T. Quevado survey, Smith County.
North Texas	13,352	1947	Simpson	Denver Producing & Refining Company's Rich 1, Grayson County.
Wyoming	13,063	1947	Dakota	Mountain Fuel Supply Company's Unit 3, Church Butte field, Uinta County.
North Louisiana	12,952	1942	Smackover	Union Producing Company's McDonald Unit 1, North Lisbon field, Caliborne Parish.
Colorado	12,702	1945	Mississippian	The Texas Company-California Company's Unit 20, Wilson Creek field, Rio Blanco County.
Alabama	12,399	1941	Jurassic	Union Producing Company's M. M. Waite 1, Sect. 27-8n-1e, Clarke County.
East Texas Border	12,221	1946	Smackover	Humble Oil & Refining Company's Pickering Lumber Co. 1, Huxley field, Shelby County.
Utah	12,146	1947	Coconino	Pacific Western Oil Corporation's Unit 1, Gordon Creek structure, Carbon County. Still Drilling.
South Central Texas	11,951	1947	Schist	Magnolia Petroleum Company's Wm. McKinley 1, Frio County.
Texas Panhandle	11,737	1947	.....	Phillips Petroleum Company's Jenke 1, Roberts County. Still Drilling.
Arkansas	11,137	1944	Eagle Mills	Union Producing Company's Crossett Lumber Co. E-1, Sect. 12-19-7, Ashley County.
Washington	11,002	1947	.....	Standard Oil Company of California's Alderwood Comm. 1, Snohomish County.
Michigan	10,665	1947	.....	Ohio Oil Company-Pure Oil Company's Reinhardt 1, West Branch field, Ogemaw County. Still Drilling.
North Dakota	10,281	1938	Devonian	California Company's Kamp 1, Nesson Anticline, Williams County.
Montana	10,102	1946	Madison	Carter Oil Company-Phillips Petroleum Company's Weaselhead-Aliot 1, Browning area, Glacier County.
Pennsylvania	10,096	1944	U. Cambrian	Manufacturers Light & Heat Company's Hockenberry 1, Mercer Township, Butler County. World's deepest cable tool well.
North Carolina	10,054	1946	Basement Rocks	Standard Oil Company of New Jersey's Cape Hatteras 1, Dare County.
West Virginia	10,018	1941	Queenston	Hope Natural Gas Company's Gribble 1, Grant District, Harrison County.
New York	8,626	1944	Ordovician	New Penn Development Company's Harrington 1, Woodhull Township, Steuben County.
Kansas	8,243	1947	.....	Stanolind Oil & Gas Company's Feathers 1, Seward County.
Maryland	8,165	1941	Helderburg	William Snee's Schartser 1, Accident District, Garrett County.
West Central Texas	7,980	1945	Ellenburger	Humble Oil & Refining Company's C. H. Tompkins 1, T & P Railway survey 169, Parker County.
South Dakota	7,980	1943	Ordovician	Northern Ordnance Company, Inc.'s Harding County School Lands 1, Camp Cook Anticline, Harding County
Ohio	7,889	1933	Clinton	Sylvania Production Company's Knowlton 1, Independence Township, Washington County.
Georgia	7,490	1944	Cretaceous	Stanolind Oil & Gas Company's J. H. Pullen 1, Mitchell County.
Illinois	7,207	1940	St. Peter	Pure Oil Company's Billington 3, Sect. 26-1n-7e, Clane field, Wayne County.
Oregon	6,939	1944	Basalt	Phillips Petroleum Company's well, near Coos Bay, Coos County.
Nebraska	6,846	1938	Pennsylvanian	Union Oil Company of California's Agate 15, Sioux County.
Indiana	6,408	1946	Trenton	Continental Oil Company's Cooper 1-D, Section 13-3s-14w, Gibson County.
Western Kentucky	6,117	1946	Granite	California Oil Company's Spears 1, Section 13-L-57, Lincoln County.
Tennessee	5,750	1947	Granite	Standard Oil Company of California's E. W. Beeler 1, Sect. 4-15s-29e, Giles County.
Eastern Kentucky	5,743	....	Red Medina	Columbian Fuel Corporation's Ford Motor Company 1, Pike County.
Iowa	5,305	1930	Cambrian	Oil Development Company's Wilson 1, Page County.
Arizona	4,970	1946	Gila	J. A. Robertson's Robertson 2, Maricopa County.
Missouri	4,740	1941	Cambrian	Strake Petroleum Company's T. P. Russell 1, Pemiscot County.

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Drilling Technology Progress

By J. E. KASTROP, Staff Writer

IN LITTLE more than two years following VE-Day, great strides have been made in the improvement of oil well drilling equipment and technique. The trend in both machinery and methods has been toward a more scientific approach. This "boom" in new things and new ways of drilling may be traced to a back-log of drawing board ideas delayed from the production line due to the war. Higher crude prices, greater need for oil, and increasing costs have been factors influencing the acceleration of research and development programs.

New Drilling Methods

Possibly the most unusual of all new methods introduced has been horizontal drilling. Considerably different from the idea first tried in Pennsylvania for horizontal drilling from a vertical mining shaft, this new method employs special tools in conjunction with regular rotary rigs to drill horizontal branches from the main vertical well bore. A turbine bit powered by the drilling fluid under pressure and attached to a preformed section of drill pipe provides the means of cutting into the bore face.

For more than a year, experimentation has been in progress on a new method of drilling which also utilizes a turbine bit powered by the drilling fluid under pressure. This eliminates rotating the drill pipe, and thereby holds possibilities of lengthening the life of such pipe manyfold.

Concurrent with placing the bit rotating mechanism at the bottom of the hole is a recently-developed electric drill. This method employs an electric tapered cable on which is lowered the electrically-driven bit. The driving mechanism is contained in a hollow steel cylinder 70 to 140 feet long. Drill pipe and mud pumps are eliminated. The method requires that sufficient fluid be in the hole to completely submerge the cylinder. Cuttings are deposited in a vertical bailer by a circulating pump contained in the assembly. The unit is withdrawn from the well and cuttings dumped every 30 or 60 feet of hole cut. Average weight of the complete assembly is 1700 pounds.

Possibilities of large reserves lying below the shallow waters of the Gulf Coast continental shelf brought about unusual designs and modifications of drilling equipment and methods to cope with the problems unique in offshore and marine drilling. The greatest difficulty has been in wave action due to high winds.

Platforms have been constructed in the open waters in the Gulf of Mexico and wells successfully drilled from them. For space-saving reasons, equipment had to be compact in arrangement, and additional protection had to be assured against blowouts and pollution. The tremendous cost of offshore drilling made it imperative that the structure be designed so more than one well could be drilled from a single location. One such design permits the drilling of 16 wells from one platform. For reasons of strength, steel caissons have been used and cross-braced with tubular beams to present a minimum of resistance to wave action.

Oil Well Cementing

Considerable study has been directed toward the problem of proper use of cement in oil wells. Channeling and mud contamination have been the source of trouble in cementing casing in deep, high-pressure wells. Laboratory experiments have shown the value of slowly rotating the casing while pumping the cement in place. Devices known as centralizers and scratchers, which are attached at selected intervals along the casing, also have been used to distribute cement evenly around the casing. Better bonds between the sand face and the cement have resulted. When attached to the casing, which is lifted and lowered and/or rotated in the hole, these devices remove the mud cake from the sand face and permit the cement to make a better seal against the sand.

Radioactive admixtures, such as carnotite, have been added to the cement slurry, prior to cementing casing or squeeze cementing, for the sole purpose of indicating the distribution of the cement after it has been placed behind the casing. The radioactive substances are detected later by the gamma ray log.

Progress has been made in multiple-stage cementing where it is desirable and less expensive to perform more than one cement job in one cementing operation. The development of a special differential valve has facilitated multiple stage cementing in deep, high-pressure, high-temperature wells. With this device it is possible to cement the casing in the well and immediately following, place a second batch of cement between two adjacent productive zones located higher up the hole.

Oil Well Surveying

Continued research produced several improvements in oil well surveying. Of considerable importance is a device to measure the direction and angle of dip of certain formations. By orienting the electrode opposite the formation in three different directions and taking potential measurements in each case, such readings may be correlated to give the dip.

While radioactivity logging has been used for several years, its use has been intensified since World War II. New developments permitted minimum logging speeds as a result of longer and larger ionization chambers. The meaningless deflection has been reduced to a negligible factor.

Definite improvements have been made in wire line measurements. Factors affecting such depth measurements have been calibrated. It has been found that each wire line has a "personality" of its own which has to be accounted for, as well as the type of fluid in the hole, depth, temperature, etc. This improved tool has been coordinated with a collar-logging device incorporated in the radioactivity logging equipment. It functions on the principle of strong magnetic fields produced by concen-

trated masses of steel such as are found in casing collars. A reference point or collar point is made on the radioactive recording chart as the log is run to indicate and correlate the log with the location of casing collars in the well.

Drilling Fluids

Probably no other phase of the drilling process has undergone such extensive research as that of drilling fluids. Outstanding improvements in this field have been toward bettering the filtration characteristics of all type muds, and increasing their resistance to contamination. The use of lime in "red muds" (treated with caustic soda and quebracho) has proven successful in many cases to permit the addition of weighting materials with lessened effects on filtration rate, gel strength, viscosity, etc. These red-lime muds are less affected by contamination from native clays or salt water, and a reduction in over-all mud costs has been realized.

Oil-base muds, developed during the war, have received improvements and extended use in the immediate postwar period. They are used primarily for drilling into producing zones in order to eliminate water blocking and mudding off the producing sand. They are not adversely affected by salt, cement, anhydrite, etc., and their low filtrate loss enables the operator to drill through heaving shale. They are dry powders which are mixed with light diesel or similar oils. Present electrical logging methods rely on the conductivity of drilling fluid for making electrical contact with the formation. Since oil-base muds are non-conductors of electrical currents, they are not desirable as a medium in which to run electrical logs. However, a new type surveying tool which sets up an induced field about the electrode has been developed recently to overcome this trouble. This method of electrical logging is independent of the surrounding fluid, and will, possibly, produce a curve comparable to the resistivity curve on normal logs.

Oil-emulsion mixtures, which may be added to water-base muds, have been used in many wells. Experience indicates that these fluids can be controlled in a similar manner to water-base muds, and the drilling-in functions of the two types of mud are comparable.

New materials have been developed to stop lost circulation, and this list has grown considerably in the past year.

Starches and vegetable gums have been found to be stabilizing agents for muds when drilling through salt or anhydrite. Their use brings about difficult problems in the treatment of mud. The pH of the stream must be maintained at least 10.5 or above, and in most cases, agents must be added to prevent fermentation.

The past year brought full acceptance of the diamond core bit as a result of developments and improvements that made it a superior method of drilling wells in the Rangely field, Colorado, and the West Edmond field, Oklahoma. Small bits were experimented with at first because of the high cost of commercial diamonds. But their economy in drilling hard formations in the Rangely area was soon proven and the development of diamond bit coring began on a full scale. Bits now used have a high salvage value so that all is not lost. Bit sizes now available range up to nine inches in outside diameter and cut a core 4⅞ inches in diameter. Core barrels range from 50 to 90 feet long. Improved bits drill 600 to 700 feet in the Rangely field before need of replacement.

Reverse Circulation

While the fundamental principle of reverse circulation dates back to the 1930's, improvements in equipment made its application to diamond bit coring a logical one. Reverse circulation had been used satisfactorily at Rangely to reduce the number of round trips. Cores were broken off and pumped up to a special catcher below the kelly and were removed when a new joint of drill pipe was added to the string.

By putting in special lines in the mud system, and employing a stripper head or blowout preventer above the mud cross, it is a simple matter to reverse the mud flow. A recent device which simplifies reverse circulation procedures is a reverse-circulation rotary packer which is connected immediately below the kelly. It provides a means of packing off the drill string from the casing and diverting the flow from the drill string to the casing annulus. With this device, no change need be made in normal rig setup.

Cutting and Fishing

While principles employed in cutting and fishing have not been changed to any outstanding degree, the metals and tools employed have undergone improvements. The advent of pressure welding and its application to the manufacturer of cutting and fishing rods have made possible this type work at unprecedented depths. Successful cutting and fishing jobs were performed in the Weller 51-11, world's deepest well in 1947, down to 16,960 feet. Fishing and cutting have been greatly facilitated by hydraulic power swivels. These are suspended over the hole to drive the drill rod or pipe and indicate to the operator what is happening to the tool on bottom. Stepless hydraulic power in both clockwise and counterclockwise directions provides sensitive control. Metals used in cutting and fishing tools are being improved, and the trend in cutting tools particularly is towards the use of tool-steel knives.

The perfection of shaped explosive charges is a new development in cutting drill pipe and casing, and in perforating pipe. By selectively shaping the highly explosive materials and controlling their detonation, a jet of vapors directed along a definite plane severs the pipe completely.

Invention of new devices has eliminated the guesswork from calculating the depths at which drill pipe may be stuck. In one such device, two electromagnets in the tool are energized to fasten themselves firmly to the inside of the pipe. The amount of stretch is measured on the surface as the drill pipe is placed in tension. The point at which the drill pipe is stuck is indicated when there is a sudden transition in the amount of stretch.

Rotary Rig Design

Advancement in rotary rig designs is bringing about a new era of conception as far as drilling equipment is concerned. There is a definite trend toward automatic control of the flexible elements entering into the drilling procedure.

Designers are providing greater availability of power in packaged units. Considerable stress has been placed on versatility of prime movers, as well as increased power without commensurate additions of weight and bulk.

The sum total of these numerous and important achievements is to lower the cost of drilling oil and gas wells. Two prime objectives bring this about: First, a greater percentage of time can be spent in rotating on bottom or making hole, and second, a minimum of time and effort are spent in dismantling and erecting the equipment.

Weight and Torque Control

In this category, an important development is the walking feedoff air brake which automatically feeds drill pipe into the hole to maintain a predetermined weight on the bit. It is a combination hydraulic and pneumatic system that can be incorporated on either a steam of power rig. This control system makes it possible to actuate the hydraulic feedoff orifice valves on a hydraulic feeding device, take weight shown on the weight indicator to control the automatic feedoff mechanism, to stop feedoff automatically when weight on the bit reaches a maximum predetermined value, to automatically

shift the automatic control from weight to drill pipe torque when the torque reaches a predetermined value, indicate and record drilling rates, and govern rotary speeds through remote controls coupled with regulating governors.

A similar function as described above may be found in the application of converters. These devices have been used to replace mechanical transmissions or parts thereof in power rigs. They can be considered as infinitely variable hydraulic transmissions whose torque transmission characteristics vary over a wide range. They shift automatically with load and may multiply input torque as much as five times when stalled. Through these devices the weight on the drill pipe may be controlled automatically.

Power Transmission and Couplings

The flexibility of power rigs has been considerably increased through the improvement of power transmission units. These units have become a precision machined product incorporating special steels and alloys which increases their life and capacity. Pressure lubrication and enclosed oil baths have provided automatic lubrication to the bearings, gears and chains. Compounding of individual engines and the application of power takeoffs for pumps and drawworks with separate controls and for different speeds are possible through the improved power transmissions.

Air-operated clutches may be found on most modern rigs. By alternately inflating and deflating a heavy-duty tube surrounding the clutch face, the clutch may be engaged and disengaged from a remote point by merely opening and closing a four-way air valve.

Fluid drives or hydraulic couplings between the engines and the power transmission have provided flexible controls and smooth power loading on the prime movers. The fluid medium absorbs the torsional vibrations and reduce shock loads of pumps and hoisting equipment.

Hoisting Equipment

With increased depths and the need for longer and heavier drill strings, there have been introduced larger drawworks of 2000 horsepower ratings. Developments have been in bearings, sprockets and multiple chains, providing a greater range of speed step control. The sand line hoist has been incorporated in late model drawworks and is located on top of the unit to make a compact hoisting mechanism and eliminating a separate sand line hoist.

Latest addition to the drawworks is the dynamatic brake which is coupled to the drum shaft. It consists basically of an electro-magnetic rotor operating within but not touching an outer stator. Eddy currents produced in the drum or rotor exert a pull on the electro-magnets to produce a braking action. Current supplied the electro-magnets is furnished by the rig light generators. The braking action is variable and may be controlled by the amount of current passing through the field coils. There are no commutators, brushes or slip rings.

Rig floor work while coming in or out of the hole has been improved through the development of power operated slips.

Electric Rigs

The trend in recent electrical rigs has been toward simplification of hookup, reduction in bulk of component parts, and close control over power demands. A recent diesel-electric barge rig placed in operation on the Gulf Coast is capable of developing 50 percent more power than that developed by a 14 x 14-inch steam engine operating on 350 pounds steam pressure. Use of the electro-hydraulic governors permit the automatic adjustment of engine speed as the load demand varies so that the lowest possible engine speed is provided to efficiently handle the load demand on the generators.

High-horsepower electric motors may now be cooled by a new system similar to the cooling system of an internal combustion engine. The jacket water is circulated through a radiator and cooled by means of forced draft.

Unique in electric rigs is a completely portable model mounted and transported on seven large trailers.

Drilling Strings

Engineering calculations and field operation have proven the advantage of larger diameter drill pipe. By employing five or 5 9/16-inch outside diameter pipe the hydraulic horsepower loss due to fluid friction is considerably reduced. Torque strength is also increased. The acceptance of exceptionally long drill collar strings in drilling consolidated formations was established in 1947. Some drill collar strings measured more than 200 feet. Improved metals and threading of drill collars received attention from manufacturers, and the introduction for the first time of drill collar tool joints met with much success.

Pressure Control

A new design in well pressure control equipment is a versatile unit which will form a pressure packoff around any tool within the rated size of the preventer without changes in packing elements. It makes a seal in an open hole. It is compact and is controlled by a four-way valve which allows a pressure medium to enter the lower chamber of the preventer and raises a circular template against the rubber packing element.

Mud Systems

There has been a decided interest on the part of rig designers to the problem of pulsation. The pressure curve on the mud system has been smoothed somewhat by triplex pumps. Pulsation dampeners on mud lines have been used successfully. One such device consists of a large steel vessel divided in the middle with a rubber diaphragm. One side is pressurized with nitrogen gas while the opposite side is connected to the mud line. Pulsations in the fluid system are absorbed through the diaphragm to smooth the pressure characteristics of the line.

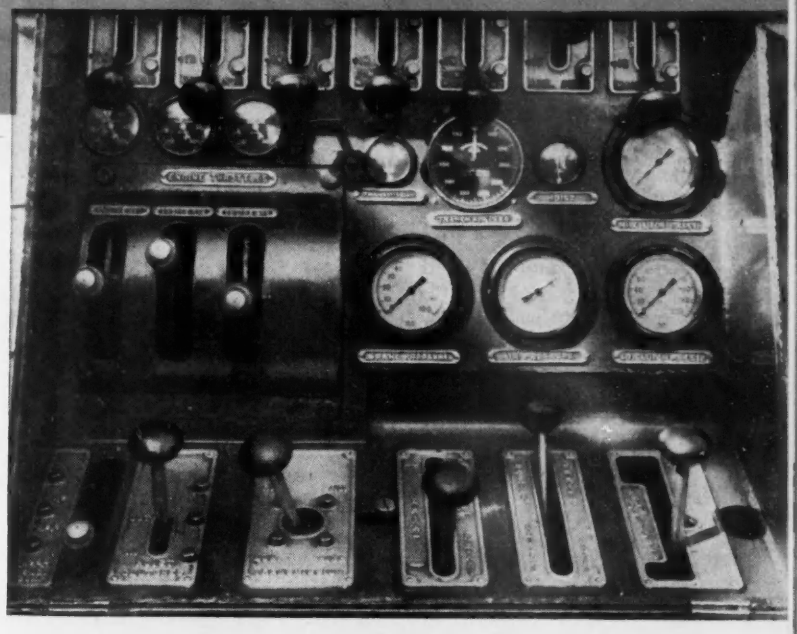
Accompanying deeper wells is the need for higher horsepower mud pumps of sufficient volume to meet the needs of deeper drilling. Improved metals and designs have aided in a reduction in weight and bulk of pumps, and have upped efficiencies and life.

The trend in manufacture of wire rope has been in the direction of larger diameters and higher tensile strength. Reason for this lies in the requirements for deeper drilling below 15,000 feet. Along with larger diameters, to 1⅛ inches, larger crown block and travelling block sheaves have been designed for prolonged life of wire rope. Improvements have been made in dead-line anchors and drawworks drums. Preformed wire rope of greater lengths have been used extensively. With the demand for stronger, flexible wire rope, research efforts have been directed toward metallurgical improvements, and results of these programs will continue to better the psysical characteristics of this item. Lubricants used in the manufacture of wire rope have also been improved resulting in increased life.

Looking Ahead

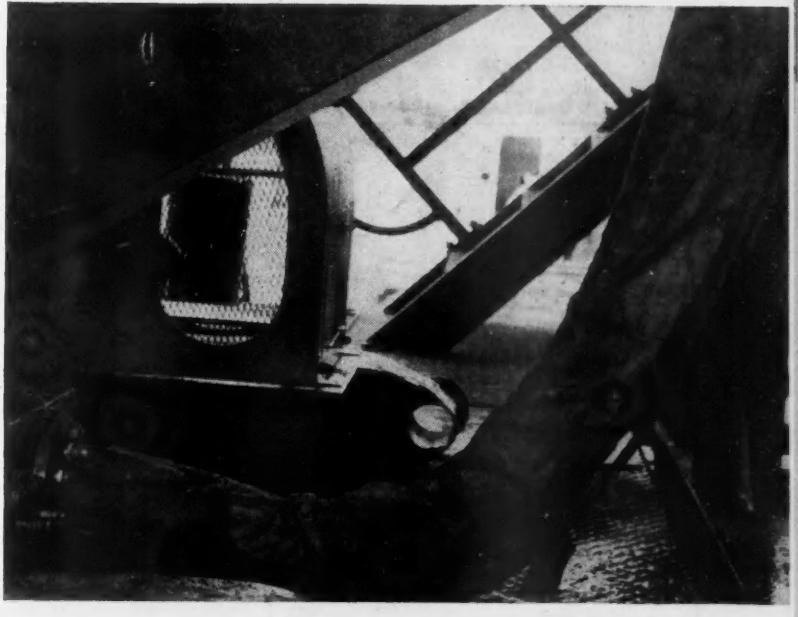
The developments outlined above are far from being a complete list of the drilling industry's accomplishments during the past two years. To touch upon each new product or technique would require several volumes. However, it is quite clear that unprecedented progress is being made in this field. Based upon what has been done in the way of bettering the science of drilling oil wells, it is not illogical to expect equally drastic changes in the next two years as those brought about in the past two years. With demand for oil at an all-time peak, and with the search for more reserves going deeper, the foregoing removes any doubt that drilling rigs can and undoubtedly will be built to penetrate below 20,000 feet.

THAT HAVE MADE DRAW WORKS SO POPULAR...



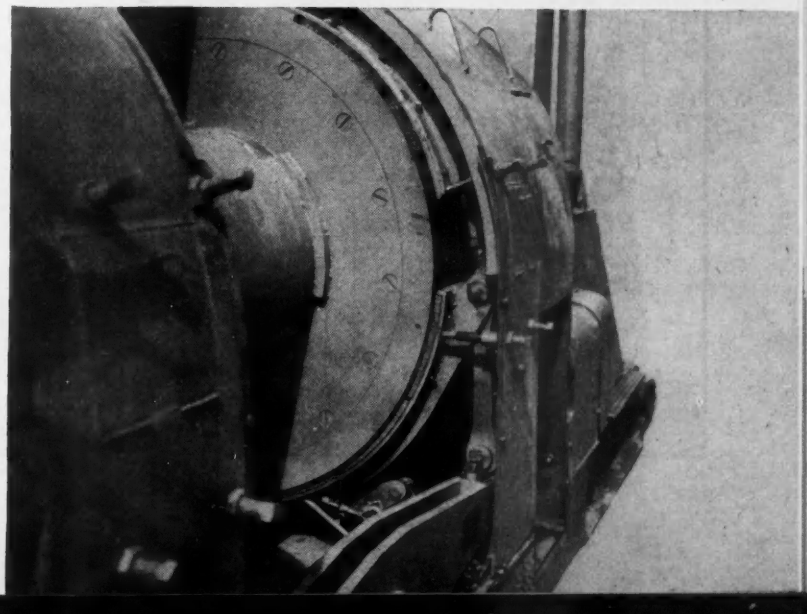
Central Control Panel

All clutches on the "Oilwell" No. 96 Draw Works and Compound Drive are air-operated and the respective clutch controls are conveniently arranged on a central control panel located at the driller's position. Dials and gauges provide a continuous visible check of the principal mechanical functions of both the draw works and the drive. These gauges permit the driller to ascertain instantly the vacuum on his engines, the air reservoir pressure, the high and low-drum clutch pressures, the brake flange water circulation, the transmission oil pressure, the draw works oil pressure, and the transmission speed. The panel is illuminated for maximum visibility.



Compact Air-Control Lines

All air-control lines between the draw works and compound drive are grouped in a single manifold so designed with an eccentrically drilled round flange that the manifold can only be connected in the proper manner. The air-control lines are enclosed in a canvas cover for protection. Also shown in the photograph are three vacuum lines (connected to rectangular flange) which transmit engine-manifold pressures to gauges in the control panel.



Safe Brake Mechanism

The brake on the "Oilwell" No. 96 is of the self-energizing type, designed to stop and hold capacity loads with a minimum of manual effort. It is of a patented full-wrap design and consists of a pair of bands having independent shoes which provide almost 360 degrees of contact with the brake flanges. The brake flanges are made of heat-treated forged alloy steel of carefully controlled hardness, assuring the best performance of both the flanges and the brake lining. The brake hand lever at the driller's position is connected to the brake bands through a compound brake leverage system which offers high mechanical advantage and assures quick stops and positive holding of the load. This steel brake lever is well balanced and is equipped with a locking device that permits it to be held in any desired position.

4901 Drilling Rigs in Operation As 1948 Begins

AT THE end of 1947 there were 4901 drilling rigs in operation in the U. S., about 250 or 5 percent more than were in use at the beginning of the year. This was not the largest number of rigs that had been active during the period, but was the fourth largest in a year that saw the industry utilize a record number of drilling outfits.

For the first time in history drilling rigs in use reached the 5000 level and that occurred at the end of August, 1947, when they totaled 5136. Other months that exceeded the end of December's figure were July and September when 4992 and 4979 respectively were reported.

Texas, as usual, had the largest number of active drilling rigs at the end of the year, numbering 1361 and topping the total of a year before by 10 percent. West Texas continued to use more rigs than any of the state's other districts.

Oklahoma, with 544 rigs active, continued to hold second place and showed an increase since the start of the year. Pennsylvania and West Virginia, with 449 and 384 rigs respectively, occupied third and fourth places, and Kansas, with 338, was in fifth position.

U. S. Drilling Rigs in Use During 1947, by States, by Months

Figures are for end of month, and include rigs drilling, rigging up and shut down.

STATE OR DISTRICT	1946	1947											
	December	January	February	March	April	May	June	July	August	September	October	November	December
Alabama	11	7	3	3	3	6	7	8	6	4	6	5	2
Arizona	.....	.....	2	2	2	2	2	2	.....	.....	.....	1	1
Arkansas	27	35	31	34	33	34	40	31	42	48	37	43	40
California	323	293	309	291	282	267	266	254	277	270	273	283	275
Colorado	56	54	46	47	48	47	62	74	81	74	72	67	63
Florida	9	10	6	7	7	6	6	6	6	4	5	4	4
Georgia	.....	1	1	.....	.....	1	2	1	1	1	1	1	.....
Illinois	236	232	229	183	185	215	229	235	217	211	229	212	214
Indiana	65	63	75	71	82	64	70	87	82	81	79	76	66
Iowa	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kansas	347	356	327	298	284	304	297	378	387	384	348	320	338
Kentucky	100	96	100	105	112	123	127	119	116	110	99	84	75
Louisiana	162	145	146	149	161	169	190	196	188	194	198	200	195
North Louisiana	55	51	49	50	62	40	67	61	71	81	76	73	69
South Louisiana	107	94	97	99	99	129	123	135	117	113	122	127	126
Maryland	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	1
Michigan	103	105	129	127	115	105	110	134	121	135	133	137	118
Mississippi	62	60	70	92	97	99	91	85	78	75	69	62	58
Missouri	5	1	.....	3	2	4	4	5	6	6	6	6	3
Montana	47	43	37	39	34	64	64	72	78	66	77	73	61
Nebraska	3	2	6	6	6	6	6	6	5	4	4	1	1
New Mexico	114	102	110	107	109	122	126	135	134	122	124	116	106
New York	[5]104	[5]102	[5]101	149	156	180	196	231	240	216	228	202	204
North Carolina	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio	264	239	232	233	249	232	244	239	252	252	262	248	223
Oklahoma	495	502	484	515	497	514	503	515	527	523	506	532	544
Oregon	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	[5]412	[5]365	[5]371	332	360	361	396	416	431	440	421	425	449
South Dakota	2	1	.....	.....	.....	.....	.....	.....	.....	1	1	1	1
Tennessee	10	10	10	10	10	5	7	7	11	11	11	17	19
Texas	1,236	1,133	1,134	1,120	1,160	1,218	1,277	1,284	1,393	1,294	1,247	1,276	1,361
Dist. 1: S. Central	30	32	28	31	22	30	34	29	36	43	49	58	59
Dist. 2: Middle Gulf	[1]	[1]	43	58	52	61	58	58	62	55	68	69	67
Dist. 3: Upper Gulf	81	77	87	84	92	98	98	124	137	123	112	125	127
Dist. 4: L. Gulf-S.W.	151	133	108	112	94	107	109	108	109	113	119	109	124
Dist. 5: East Central	[2]	[2]	25	24	23	16	32	29	22	29	28	30	30
Dist. 6: Northeast	99	89	73	66	60	69	68	61	68	73	69	57	58
Dist. 7-B: North Central	[3]	[3]	124	115	121	122	131	122	126	130	106	105	125
Dist. 7-C: West Central	[4]	[4]	71	63	62	67	73	62	73	54	54	59	65
Dist. 8: West	418	495	324	331	353	364	386	404	495	439	422	441	460
Dist. 9: North	343	201	140	141	167	168	172	162	136	104	100	107	116
Dist. 10: Panhandle	114	106	111	95	114	116	116	125	129	131	120	116	130
Utah	7	5	6	5	5	4	7	6	6	9	12	13	15
Washington	1	1	1	1	1	1	1	1	.....	2	1	1	1
West Virginia	391	372	380	390	382	369	375	368	362	356	365	371	384
Wyoming	60	53	55	60	52	80	97	97	116	86	82	93	79
Total United States	4,654	4,390	4,402	4,379	4,434	4,603	4,802	4,992	5,163	4,979	4,897	4,871	4,901

[1] Dist. 2 included with Dist. 4. [2] Dist. 5 included with Dist. 6 [3] Dist. 7-B included with Dist. 9. [4] Dist. 7-C included with Dist. 8. [5] New York part (about 1/7) of Bradford field included with Pennsylvania.

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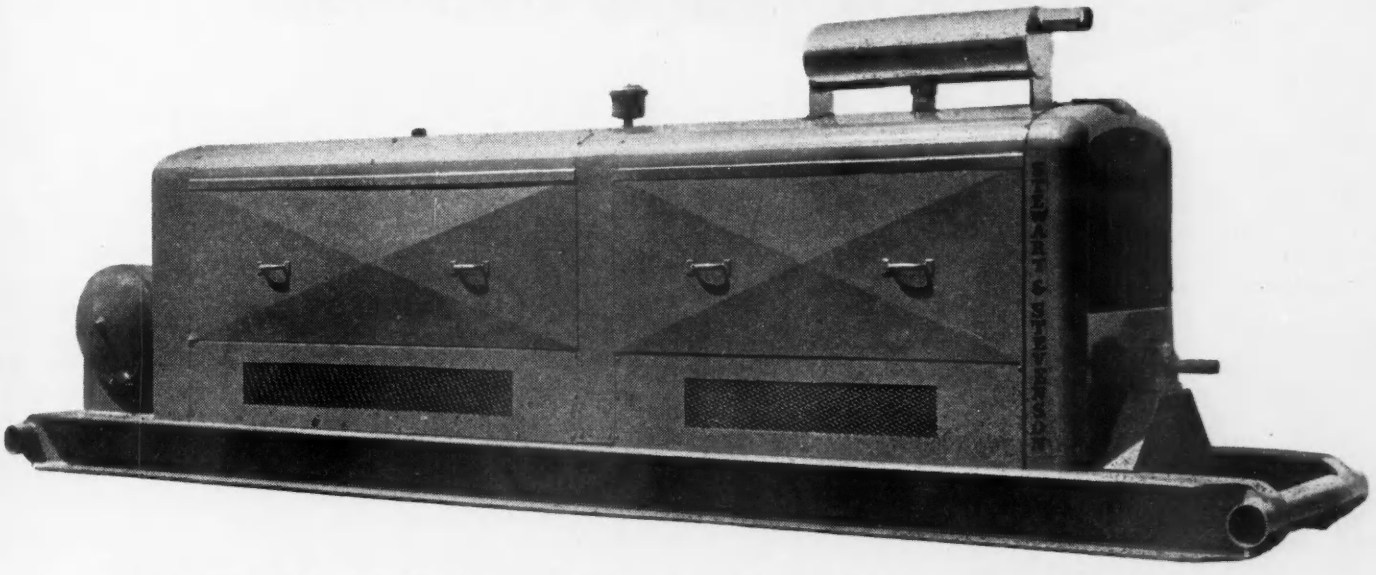
STEWART & STEVENSON AUXILIARY UNITS



Model 20-D, Diesel Driven 10 KW lighting generator, 17 cu. ft. air compressor, 150 GPM wash-down pump, welding generator and accessory drive. (Welder and accessory drive optional.)

PROVED IN 1947—IMPROVED IN 1948

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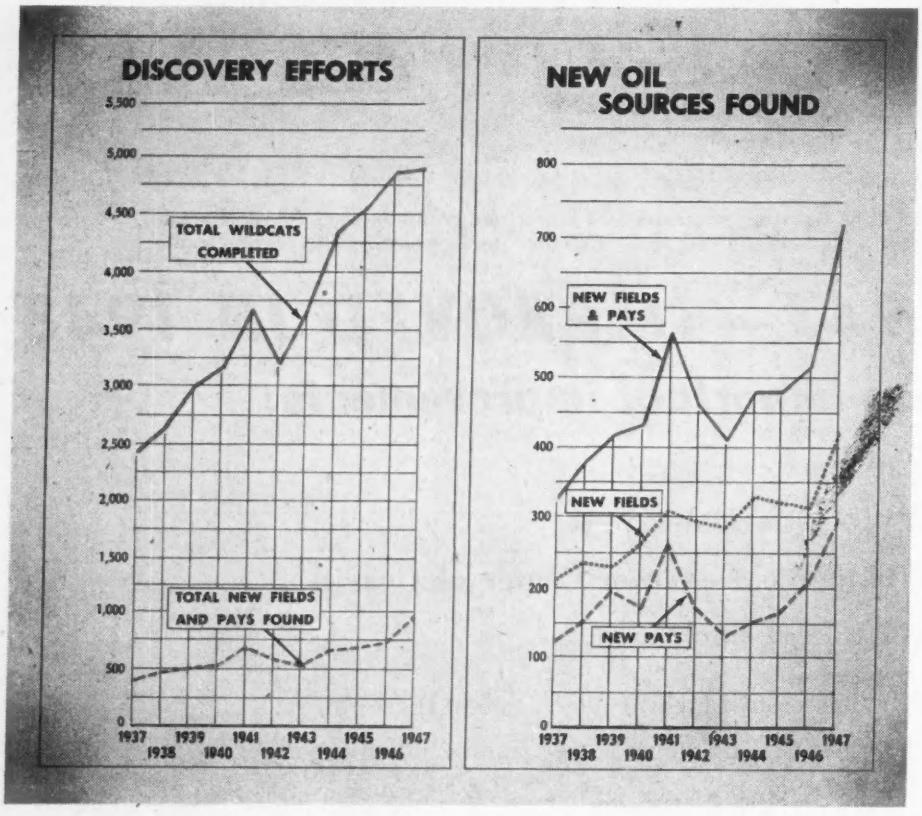
Wildcat Drilling
Highest Despite Handicaps

By CECIL SMITH
Staff Writer

THE determined search by the petroleum industry of the U. S. to locate new oil reserves during 1947 is clearly illustrated by the new all-time record high of exploratory wells drilled. The industry was faced with the greatest demand for products in history, and aided by substantial increases in crude prices did a splendid job of continuing necessary exploration.

The year's record was remarkable, not only for in that more exploratory wells were drilled than ever before, but also because they were drilled under some very adverse conditions. Some areas experienced shortages of cement and drilling muds during the first part of the year, a result of inadequate transportation, while operators all over the country felt the pinch of tubular shortages. Had casing and drill pipe been plentiful, there is no doubt that the year's exploration campaign would have been even more intense.



Year	Total New Oil, Gas and Distillate Sources Found			New Oil Sources Found			New Gas Sources Found			New Distillate Sources Found		
	Total	New Fields	New Pays	Total	New Fields	New Pays	Total	New Fields	New Pays	Total	New Fields	New Pays
1937	376	239	137	322	203	119	48	33	15	6	3	3
1938	423	264	159	373	229	144	42	31	11	8	4	4
1939	473	258	215	414	224	190	55	33	22	4	1	3
1940	492	309	183	428	261	167	62	46	16	2	2	0
1941	650	362	288	562	301	261	83	58	25	5	3	2
1942	523	348	175	451	288	163	57	47	10	15	13	2
1943	499	347	152	403	276	127	72	56	16	24	15	9
1944	633	460	173	475	326	149	117	102	15	41	32	9
1945	647	451	187	475	317	158	128	113	15	44	30	14
1946	688	412	276	513	308	205	104	75	29	71	29	42
1947	932	556	376	717	424	293	117	88	29	98	44	54

During 1947, the industry completed 5539 exploratory tests, an increase of 12 percent over the 4947 completed in 1946, which had been the all-time high. Of this record-breaking total a better-than-average part was successfully completed. Those that found production numbered 1130 and amounted to 20.4 percent of the total, while 970 producers represented 19.6 percent in 1946.

The successful exploratory tests of 1947 included 932 that located new sources of oil, distillate and gas, and 198 that extended production in proven fields. The 932 new fields and new pays found were an increase of about 35 percent, compared with 688 during 1946. New fields numbered 556 in 1947 and 412 in 1946.

New crude oil discoveries increased to 717 from 513 the year before. There were 424 new fields and 293 new pay horizons last year compared with 308 fields and 205 pays in 1946. Extensions to known oil fields showed a slight drop.

Distillate discoveries during the year increased to 98 from the preceding period's 71, and these were made up of 44 new fields to 29 the year before and 54 new pays against 42. Distillate field extensions outnumbered those of 1946 17 to seven.

The year's gas discoveries made only a slight gain over the previous year's amounting to 117 to 104. These new gas sources were 88 new fields against 75 and 29 new pays in each of the two years. However, gas field extensions during 1947 numbered only 29 and fell far short of the previous year's 115. A large part of this difference resulted from the big development program in Kansas' huge Hugoton gas field during 1946.

Ready to go to work

Jack Ammann Photogrammetric Engineers, within the past two years, have been carrying on extensive aerial mapping operations in the eight-state area* pictured above. When the winter snows are gone they'll be back with experienced crews to resume work and keep pace with newest developments and demands.

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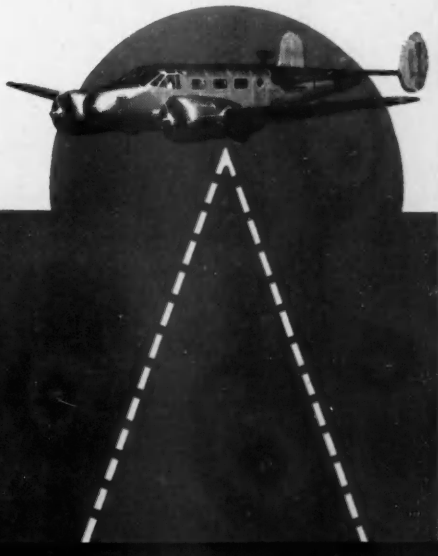
AERIAL SURVEYS — PRECISE PHOTO MAPS — CONTOUR MAPS

LAND SURVEYS — REGIONAL AND FEE MAPS — REPRODUCTIONS



JACK AMMANN

PHOTOGRAMMETRIC ENGINEERS

AERIAL SURVEYS AND MAPS

829-31 N. ST. MARYS ST SAN ANTONIO 2, TEXAS

Results of Exploratory Drilling in the United States in 1947, by States, and Comparison with Earlier Years

(Based on Data Compiled by the Staff of World Oil)

PART 1: Productive Tests

State or District	OIL									DISTILLATE									GAS									TOTAL PRODUCTIVE		
	New Fields			New Pays			Extensions			New Fields			New Pays			Extensions			New Fields			New Pays			Extensions					
	No.	Footage	Avg. Depth	No.	Footage	Avg. Depth	No.	Footage	Avg. Depth	No.	Footage	Avg. Depth	No.	Footage	Avg. Depth	No.	Footage	Avg. Depth	No.	Footage	Avg. Depth	No.	Footage	Avg. Depth	No.	Footage	Avg. Depth	No.	Footage	Avg. Depth
Alabama	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....
Arkansas	5	24,690	4938	4	15,550	3887	1	3,142	3142	..	.....	....	2	15,581	7791	..	.....	....	..	.....	....	..	.....	....	..	.....	....	12	58,963	4913
California	10	61,742	6174	11	78,778	7161	7	31,769	4538	..	.....	....	..	.....	....	..	.....	....	1	4,904	4904	..	.....	....	3	7,776	2592	32	184,969	5780
Colorado	2	6,821	3411	..	.....	....	1	5,225	5225	..	.....	....	..	.....	....	..	.....	....	1	410	410	..	.....	....	3	7,175	2391	7	19,631	2804
Florida	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....
Georgia	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....
Illinois	28	76,886	2746	62	169,322	2731	52	147,942	2845	..	.....	....	..	.....	....	..	.....	....	..	.....	....	1	1,336	1336	1	2,331	2331	144	397,817	2762
Indiana	15	26,284	1752	8	15,389	1923	1	1,675	1675	..	.....	....	..	.....	....	..	.....	....	1	2,404	2404	..	.....	....	..	.....	....	25	45,752	1830
Kansas	58	190,990	3292	..	.....	....	2	7,223	3611	..	.....	....	..	.....	....	..	.....	....	12	47,371	3948	..	.....	....	1	8,243	8243	73	253,827	3477
Kentucky	5	8,844	1768	1	17,82	1782	2	3,737	1868	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	8	14,363	1795
Louisiana	18	145,100	8061	32	275,110	8597	4	23,751	5937	9	88,643	9850	19	205,784	10831	2	17,882	8941	4	36,804	9201	..	.....	....	..	.....	....	88	793,074	9012
North Louisiana	7	40,749	5821	2	8,570	4285	1	2,565	2565	3	23,845	7948	1	5,384	5384	2	17,882	8941	1	3,405	3405	..	.....	....	..	.....	....	17	102,400	6023
South Louisiana	11	104,351	9486	30	266,540	8884	3	21,186	7062	6	64,798	10799	18	200,400	11133	..	.....	....	3	33,399	11133	..	.....	....	..	.....	....	71	690,674	9727
Michigan	10	25,379	2537	..	.....	....	6	14,445	2407	..	.....	....	..	.....	....	..	.....	....	4	8,812	2203	1	1,452	1452	..	.....	....	21	50,088	2385
Mississippi	5	41,839	8367	1	6,275	6275	3	27,135	9045	..	.....	....	1	6,680	6680	1	6,676	6676	1	2,225	2225	..	.....	....	..	.....	....	12	90,830	7569
Missouri	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....
Montana	1	6,795	6795	1	3,451	3451	2	4,838	2419	..	.....	....	..	.....	....	..	.....	....	1	4,977	4977	1	2,857	2857	..	.....	....	6	22,918	3819
Nebraska	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....
New Mexico	6	22,979	3830	3	18,413	6137	2	13,384	6692	..	.....	....	1	9,152	9152	..	.....	....	..	.....	....	..	.....	....	1	9,247	9247	13	73,175	5628
North Carolina	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....
Ohio	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	3	10,588	3529	..	.....	....	9	31,258	3473	12	41,846	3487
Oklahoma	77	383,538	4981	4	11,565	2891	5	22,859	4571	2	9,213	4606	..	.....	....	..	.....	....	18	71,299	3961	..	.....	....	1	8,447	8447	107	506,921	4737
Oregon	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....
Pennsylvania	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....
Tennessee	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....
Texas	176	911,111	5176	161	939,352	5834	53	293,645	5540	33	254,835	7722	31	267,915	8643	12	85,945	7162	37	169,029	4568	26	165,284	6357	9	64,270	7141	538	3,151,386	5857
Dist. 1: S. Central	9	26,883	2987	1	4,084	4084	4	21,001	5250	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	14	51,968	3712
Dist. 2: Middle Gulf	8	62,306	7788	12	83,948	6995	3	23,306	7768	14	117,687	8406	9	66,398	7378	1	7,852	7852	7	40,050	5721	7	35,250	5035	2	12,254	6127	63	449,051	7127
Dist. 3: Upper Gulf	16	127,219	7945	25	176,606	7064	4	26,544	6636	9	71,765	7973	10	91,378	9138	3	23,967	7989	6	41,685	6948	8	56,148	7018	..	.....	....	81	615,312	7596
Dist. 4: L.Gulf-S.W.	26	154,083	5926	47	293,143	6237	4	19,651	4912	6	35,299	5883	10	85,269	8527	6	43,149	7192	12	42,581	3548	9	62,095	6899	2	14,455	7227	122	749,725	6145
Dist. 5: East Cent.	5	13,784	2756	3	9,752	3250	2	17,823	8911	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	2	22,499	11249	12	63,858	5321
Dist. 6: Northeast	4	31,083	7770	4	24,426	6106	1	4,725	4725	3	26,334	8778	2	24,870	12435	1	6,204	6204	2	16,267	8134	..	.....	....	1	6,115	6115	18	140,024	7779
Dist. 7-B: N. Cent.	40	150,394	3759	24	88,181	3674	1	3,115	3115	1	3,750	3750	..	.....	....	..	.....	....	7	19,654	2808	..	.....	....	..	.....	....	73	265,094	3631
Dist. 7-C: W. Cent.	18	70,132	3896	3	14,191	4730	4	13,349	3337	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	1	6,270	6270	26	103,942	3997
Dist. 8: West	22	151,083	6867	17	141,262	8309	21	122,580	5837	..	.....	....	..	.....	....	..	.....	....	1	3,380	3380	2	11,791	5895	..	.....	....	63	430,096	6826
Dist. 9: North	27	117,152	4338	25	103,759	4150	9	41,551	4661	..	.....	....	..	.....	....	1	4,773	4773	2	5,412	2706	..	.....	....	..	.....	....	64	272,647	4260
Dist. 10: Panhandle	1	6,992	6992	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	1	2,677	2677	2	9,669	4834
Utah	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....
Washington	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....
West Virginia	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	3	5,991	1997	..	.....	....	..	.....	....	3	5,991	1997
Wyoming	8	47,770	5971	5	15,963	3192	11	61,411	5583	..	.....	....	..	.....	....	2	25,755	12878	2	16,125	8062	..	.....	....	1	3,950	3950	29	170,974	5895
U. S. Total, 1947	424	1,980,768	4672	293	1,550,950	5293	152	662,181	4356	44	352,691	8016	54	505,112	9354	17	136,258	8015	88	380,939	4328	29	170,929	5894	29	142,697	4920	1130	5,882,525	5205
U. S. Total, Earlier Years																														
1946	308	1,359,787	4415	205	1,227,305	5987	160	707,585	4422	29	264,441	9119	42	411,425	9796	7	63,111	9016	75	272,564	3634	29	166,588	5744	115	406,774	3537	970	4,879,580	5030
1945	317	1,503,763	4774	158	894,688	5663	154	702,822	4564	30	269,915	8997	14	140,464	10033	6	54,162	9027	113	486,529	4306	15	67,455	4497	70	216,103	3087	877	4,335,901	4944
1944	326	1,422,250	4363	149	731,764	4911	135	659,987	4889	32	250,228	7820	9	75,436	8382	10	79,797	7980	102	417,944	4097	15	95,099	6340	27	111,174	4118	805	3,843,679	4775
1943	276	1,232,396	4465	127	565,454	4452	132	559,090	4236	15	140,564	9371	9	88,031	9781	3	25,589	8530	56	212,814	3800	16	90,372	5648	10	58,996	8530	644	2,973,306	4617
1942	288	1,199,382	4165	163	879,116	5393	..	.....	....	13	121,620	9355	2	13,517	6759	..	.....	....	48	167,428	3562	10	50,712	5071	..	.....	....	524	2,431,775	4650
1941	301	1,165,966	3874	261	1,335,648	5117	..	.....	....	3	23,505	7835	2	7,109	3555	..	.....	....	58	177,974	3069	25	89,263	3571	..	.....	....	650	2,799,465	4307
1940	262	957,167	3667	167	914,442	5476	..	.....	....	2	12,792	6396	..	.....	....	..	.....	....	46	122,439	2662	16	55,983	3499	..	.....	....	493	2,062,823	4193
1939	224	782,289	3492	190	998,595	5256	..	.....	....	1	7,999	7999	3	24,709	8236	..	.....	....	33	103,450	3135	22	92,626	4210	..	.....	....	473	2,009,668	4249
1938	229	944,455	4124	144	815,186	5661	7	25,027	3575	4	23,657	5914	4	27,115	6779	..	.....	....	31	102,440	3350	11	49,634	4512	3	12,042	4014	433	1,999,556	4618
1937	203	831,123	4094	119	615,007	5168	3	9,036	3012	3	19,377	6459	3	24,574	8191	..	.....	....	33	77,389	2345	15	51,145	3410	..	.....	....	379	1,627,651	4295

■ CONTINUED ON PAGE 140

MAKES A BIG DIFFERENCE!

THE FIXED LANDING SHOULDER, an exclusive Reed feature, makes a big difference. It makes Reed Super Shrink-Grip Tool Joints safer, stronger and easier to replace than any other type.

FIRST, it serves as a gauging shoulder to make field replacement of tool joints practical. It eliminates the need for separate gauging, and assures a correctly applied tool joint.

SECOND, it protects the threads from fatigue because compression is transferred through the gauging shoulder directly to the tool joint.

THIRD, the landing shoulder acts as a seal to protect the threads from the washing action of the mud. This landing shoulder, plus the shrink-grip seal, protects the threads from corrosion and assures a clean, bright, good-as-new thread for replacing either new joints on old pipe, or old joints on new drill pipe. This landing shoulder, found ***only*** on Reed Super Shrink-Grip Tool Joints, is the ***big reason*** why operators all over the world choose Reed for lower drill string costs.

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TOOL JOINTS

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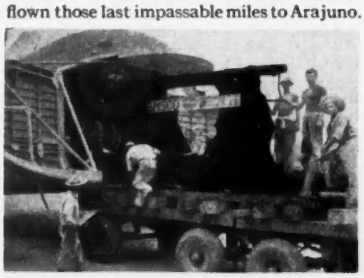
Results of Exploratory Drilling in the United States in 1947, by States, and Comparison with Earlier Years

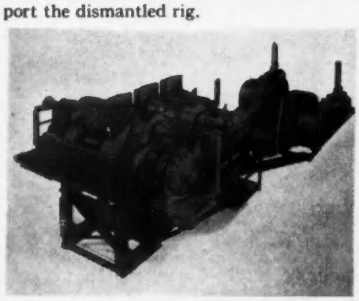
PART 2: Unproductive Tests and Total Exploratory Tests

STATE OR DISTRICT	DRY WILDCATS			DRY NEW PAY TESTS			DRY OUTPOSTS			TOTAL DRY			TOTAL EXPLORATORY TESTS		
	No.	Footage	Average Depth	No.	Footage	Average Depth	No.	Footage	Average Depth	No.	Footage	Average Depth	No.	Footage	Average Depth
Alabama	24	112,325	4680	....	.....	....	....	.....	....	24	112,325	4680	24	112,325	4680
Arkansas	72	287,246	3989	1	3,160	3160	1	3,210	3210	74	293,616	3968	86	352,579	4100
California	269	1,184,250	4402	....	.....	....	....	.....	....	269	1,184,250	4402	301	1,369,219	4549
Colorado	37	106,110	2867	....	.....	....	7	39,303	5614	44	145,413	3305	51	165,044	3236
Florida	27	129,794	4807	....	.....	....	....	.....	....	27	129,794	4807	27	129,794	4807
Georgia	5	18,770	3754	....	.....	....	....	.....	....	5	18,770	3754	5	18,770	3754
Illinois	440	1,072,933	2438	....	.....	....	....	.....	....	440	1,072,933	2438	584	1,470,750	2518
Indiana	131	248,740	1899	....	.....	....	....	.....	....	131	248,740	1899	156	294,492	1888
Kansas	344	1,248,738	3630	....	.....	....	....	.....	....	344	1,248,738	3630	417	1,502,565	3603
Kentucky	63	153,943	2444	....	.....	....	....	.....	....	63	153,943	2444	71	168,306	2370
Louisiana	268	1,653,958	6171	6	42,427	7071	1	3,703	3703	275	1,700,088	6182	363	2,493,162	6868
North Louisiana	184	748,577	4068	5	29,421	5884	1	3,703	3703	190	781,701	4114	207	884,101	4271
South Louisiana	84	905,381	10778	1	13,006	13006	....	.....	....	85	918,387	10804	156	1,609,061	10314
Michigan	235	543,134	2311	1	5,090	5090	2	4,698	2349	238	552,922	2323	259	603,010	2328
Mississippi	88	609,971	6931	....	.....	....	....	.....	....	88	609,971	6931	100	700,801	7008
Missouri	18	14,111	784	....	.....	....	....	.....	....	18	14,111	784	18	14,111	784
Montana	18	46,200	2567	1	5,852	5852	2	4,854	2427	21	56,906	2710	27	79,824	2956
Nebraska	2	7,388	3694	....	.....	....	....	.....	....	2	7,388	3694	2	7,388	3694
New Mexico	60	199,572	3326	6	31,734	5289	....	.....	....	66	231,306	3505	79	304,481	3854
North Carolina	1	6,370	6370	....	.....	....	....	.....	....	1	6,370	6370	1	6,370	6370
Ohio	43	153,615	3572	....	.....	....	....	.....	....	43	153,615	3572	55	195,461	3554
Oklahoma	530	1,817,488	3429	....	.....	....	1	3,080	3080	531	1,820,568	3429	638	2,327,489	3648
Oregon	1	8,500	8500	....	.....	....	....	.....	....	1	8,500	8500	1	8,500	8500
Pennsylvania	7	25,368	3624	....	.....	....	....	.....	....	7	25,368	3624	7	25,368	3624
Tennessee	18	28,368	1576	....	.....	....	....	.....	....	18	28,368	1576	18	28,368	1576
Texas	1,537	6,871,421	4472	31	196,004	6323	47	287,372	6114	1,615	7,354,797	4554	2,153	10,506,183	4880
Dist. 1: South Central	143	389,499	2724	....	.....	....	1	9,012	9012	144	398,511	2767	158	450,479	2851
Dist. 2: Middle Gulf	115	718,636	6249	....	.....	....	8	53,116	6639	123	771,752	6274	186	1,220,803	6563
Dist. 3: Upper Gulf	173	1,317,053	7613	3	20,441	6813	11	80,351	7305	187	1,417,845	7582	268	2,033,157	7586
Dist. 4: Lower Gulf-Southwest	258	1,237,065	4795	2	13,401	6700	15	82,951	5530	275	1,333,417	4849	397	2,083,142	5247
Dist. 5: East Central	73	291,200	3989	2	14,508	7254	1	1,510	1510	76	307,218	4042	88	371,076	4217
Dist. 6: Northeast	56	313,463	5598	3	30,444	10148	2	14,216	7108	61	358,123	5871	79	498,147	6306
Dist. 7-B: North Central	249	783,666	3147	7	26,603	3800	1	4,400	4400	257	814,669	3170	330	1,079,763	3272
Dist. 7-C: West Central	40	205,532	5138	2	14,244	7122	1	4,081	4081	43	223,857	5206	69	327,799	4751
Dist. 8: West	127	730,769	5754	5	35,130	7026	5	29,615	5923	137	795,514	5807	200	1,225,610	6128
Dist. 9: North	283	752,467	2659	5	24,995	4999	2	8,120	4060	290	785,582	2709	354	1,058,229	2989
Dist. 10: Panhandle	20	132,071	6604	2	16,238	8119	....	.....	....	22	148,309	6741	24	157,978	6582
Utah	4	20,155	5039	....	.....	....	....	.....	....	4	20,155	5039	4	20,155	5039
Washington	2	15,321	7660	....	.....	....	....	.....	....	2	15,321	7660	2	15,321	7660
West Virginia	8	39,959	4995	....	.....	....	....	.....	....	8	39,959	4995	11	45,950	4177
Wyoming	38	175,465	4618	4	22,400	5600	8	33,419	4177	50	231,284	4626	79	402,258	5092
U. S. Total, 1947	4,290	16,799,213	3916	50	306,667	6133	69	379,639	5502	4,409	17,485,519	3966	5,539	23,368,044	4219
U. S. Total, Earlier Years															
1946	3,830	14,399,824	3760	38	274,592	7226	109	418,919	3843	3,977	15,093,335	3795	4,947	19,972,915	4037
1945	3,486	14,504,642	4161	39	284,441	7293	108	375,062	3473	3,633	15,164,145	4174	4,510	19,500,046	4324
1944	3,425	13,470,846	3933	22	141,039	6411	73	383,802	5258	3,520	13,995,687	3976	4,325	17,839,366	4125
1943	2,951	10,702,429	3627	....	.....	....	36	164,155	4560	2,987	10,866,584	3638	3,631	13,839,890	3812
1942	2,652	9,320,691	3515	....	.....	....	....	.....	....	2,652	9,320,691	3515	3,176	11,752,466	3702
1941	3,047	9,651,013	3167	....	.....	....	....	.....	....	3,047	9,651,013	3167	3,697	12,450,478	3368
1940	2,672	8,649,828	3237	....	.....	....	....	.....	....	2,672	8,649,828	3237	3,165	10,712,651	3386
1939	2,488	7,764,816	3121	....	.....	....	....	.....	....	2,488	7,764,816	3121	2,961	9,774,484	3301
1938	2,179	7,012,901	3218	....	.....	....	....	.....	....	2,179	7,012,901	3218	2,612	9,012,457	3450
1937	1,943	7,173,550	3692	....	.....	....	....	.....	....	1,943	7,173,550	3692	2,322	8,801,201	3790

MAP SHOWING LOCATION OF SHELL'S WILDCAT IN ECUADOR. By ship to Guayaquil, by rail to Ambato, by truck to the base camp at Shell Mera, the rig was flown those last impassable miles to Arajuno.



LOADING DRAW WORKS FRAME INTO PLANE. The Emsco J-1000 Draw Works frame is 6'3" wide x 6'8" high x 18' long. It weighs 7300 pounds. Douglas C-47's and a Curtis Commando C-46 were used to transport the dismantled rig.



EMSCO J-1000 DRILLING RIG. The complete rig consisted of an Emsco J-1000 draw works, J-1250 selective transmission, J-1250 compounding transmission, M-50 crown and traveling blocks, JCS-20½" rotary machine, 2 14"-stroke slush pumps, engines and necessary sub-bases.

• SHELL OIL COMPANY had a tough problem. An Emsco J-1000 Drilling Rig helped solve it.

Flying A 12,000 FOOT DRILLING RIG OVER A JUNGLE BARRIER

Never in the industry's history has the need for crude petroleum and its products been greater. Oil men, all over the world, are constantly searching for new fields to satisfy this unprecedented demand. Here is a true story typifying the many problems encountered in this world-wide search for oil.

Far off, deep in the wilds of Ecuador, Shell Oil Company geologists discovered a promising geological structure. Extensive tests indicated that here might be a rich oil field. The selected drilling site was located in one of the most remote, inaccessible regions of the world—guarded by lofty Andes peaks and surrounded by the steaming green murk of the "Oriente" jungle.

This was a tough one. With months of toil, under threat of hostile head-hunting tribes, a road could be built through the dense twisting jungle. But how much easier it would be to "fly it in." Then only a landing strip would have to be cleared, with equipment dropped by parachute. But where was the rig of this size that could be broken down economically to meet the space and weight limitations of even most modern cargo airships?

Emsco Derrick & Equipment Company is known for its modern drilling rigs; streamlined rigs that solve the toughest development problems. Shell engineers consulted with Emsco—learned that the standard Emsco J-1000 rig could be easily transported by air. And so, a complete 12,000 ft. drilling rig was flown those last "impassable miles." Today, over 3000 miles from home, this Emsco rig is searching for a new deep zone; giving the same outstanding performance that make Emsco rigs favorites throughout the oil industry.

Emsco's staff of research engineers are constantly working on the development of new and better oil field equipment to meet the ever changing needs of the industry. Look to Emsco as the "*Pacemaker in Oil Field Equipment Design.*"

"PACEMAKERS IN OIL FIELD EQUIPMENT DESIGN"

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Wildcatting Success Shows Gain for 1947

WILDCAT operations comprised a greater than normal percent of the drilling tests completed in the U. S. during 1947, and a larger than usual portion of these succeeded in finding oil, gas or distillate production.

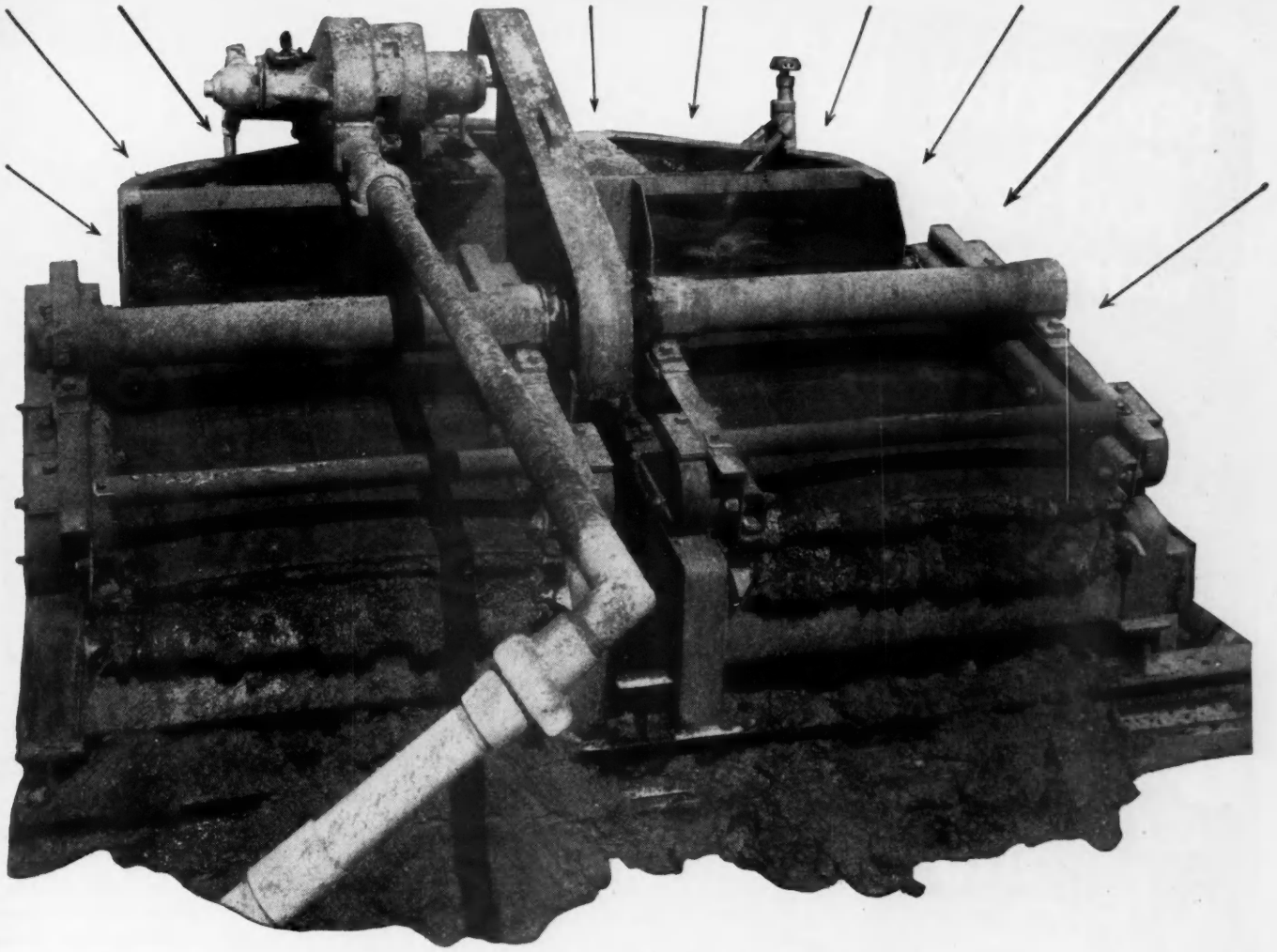
Compared with the national average for the ten-year period covering 1937-1946, wildcat tests constituted 14.7 percent.

Last year wildcat tests constituted 14.7 percent of all the wells completed, compared with an average of 11.4 percent for the ten-year period covering 1937-1946. Of the wildcats completed the past year, 11.5 percent was productive in comparison with a success ratio of 10.8 percent for the preceding decade. In 1946 only 9.8 percent of the wildcat tests completed found production.

Ratio of Wildcatting to all Drilling and Proportion of Wildcats Discovering New Fields, By Districts, 1937-1947

STATE OR DISTRICT	TEN YEARS, 1937-1946						YEAR, 1947					
		*STRICT WILDCATS						*STRICT WILDCATS				
	Total New Wells Drilled (All Classes)	Total			Productive		Total New Wells Drilled (All Classes)	Total			Productive	
		Number	Percent of All Wells	Dry	Number	Percent of All Strict Wildcats		Number	Percent of All Wells	Dry	Number	Percent of All Strict Wildcats
Alabama	151	110	72.8	107	3	2.7	30	24	80.0	24	.....	.....
Arizona	22	22	100.0	22	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas	2,169	489	22.5	448	41	8.4	326	77	23.6	72	5	6.5
California	14,135	1,697	12.0	1,610	87	5.1	1,955	280	14.3	269	11	3.9
Colorado	449	76	16.9	71	5	6.6	209	40	19.1	37	3	7.5
Florida	71	66	93.0	65	1	1.5	29	27	93.1	27	.....	.....
Georgia	30	30	100.0	30	.....	.....	5	5	100.0	5	.....	.....
Illinois	24,460	4,304	17.6	4,012	292	6.8	2,046	468	22.9	440	28	6.0
Indiana	3,549	874	24.6	794	80	9.2	627	147	23.4	131	16	10.9
Iowa	17	17	100.0	17	.....	.....	.....	.....	.....	.....	.....	.....
Kansas	18,665	2,932	15.7	2,460	472	16.1	2,581	414	16.0	344	70	16.9
Kentucky	7,743	732	9.5	653	79	10.8	861	68	7.9	63	5	7.4
Louisiana	11,843	1,545	13.0	1,330	215	13.9	1,659	299	18.0	268	31	10.4
North Louisiana	5,517	822	14.9	758	64	7.8	1,019	195	19.1	184	11	5.6
South Louisiana	6,326	723	11.4	572	151	20.9	640	104	16.3	84	20	19.2
Maryland	2	2	100.0	2	.....	.....	.....	.....	.....	.....	.....	.....
Michigan	8,962	2,432	27.2	2,254	184	7.5	716	249	34.8	235	14	5.6
Mississippi	1,611	610	37.9	588	22	3.6	468	94	20.1	88	6	6.4
Missouri	719	150	20.9	146	4	2.7	43	18	41.9	18	.....	.....
Montana	2,381	150	6.3	123	27	18.0	239	20	8.4	18	2	10.0
Nebraska	277	158	57.0	155	3	1.9	3	2	66.7	2	.....	.....
Nevada	1	1	100.0	1	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico	4,950	511	10.3	451	60	11.7	561	66	11.8	60	6	9.1
New York	14,312	27	0.2	26	1	3.7	1,863	.....	.....	.....	.....	.....
North Carolina	6	6	100.0	6	.....	.....	1	1	100.0	1	.....	.....
North Dakota	9	2	22.2	2	.....	.....	.....	.....	.....	.....	.....	.....
Ohio	11,517	244	2.1	207	37	15.2	1,322	46	3.5	43	3	6.5
Oklahoma	21,205	2,629	12.4	2,167	462	17.6	3,588	627	17.5	530	97	15.5
Oregon	3	3	100.0	3	.....	.....	1	1	100.0	1	.....	.....
Pennsylvania	34,425	26	0.1	9	17	65.4	3,449	7	0.2	7	.....	.....
South Carolina	4	4	100.0	4	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota	11	11	100.0	11	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee	295	114	38.6	108	6	5.3	21	18	85.7	18	.....	.....
Texas	87,613	11,938	13.6	10,630	1,308	11.0	9,281	1,783	19.2	1,537	246	13.8
Dist. 1: S. Central	2,569	1,026	39.9	978	48	4.7	366	152	41.5	143	9	5.9
Dist. 2: Middle Gulf	[1]	[1]	.....	[1]	[1]	.....	620	144	23.2	115	29	20.1
Dist. 3: Upper Gulf	9,053	1,259	13.9	1,105	154	12.2	872	204	23.4	173	31	15.2
Dist. 4: L. Gulf-S.W.	18,652	3,383	18.1	3,008	375	11.1	1,109	302	27.2	258	44	14.6
Dist. 5: E. Central	[2]	[2]	.....	[2]	[2]	.....	166	78	47.0	73	5	6.4
Dist. 6: Northeast	10,335	1,086	10.5	1,018	68	6.3	488	65	13.3	56	9	13.8
Dist. 7-B: N. Central	[3]	[3]	.....	[3]	[3]	.....	888	297	33.4	249	48	16.2
Dist. 7-C: W. Central	[4]	[4]	.....	[4]	[4]	.....	275	58	21.1	40	18	31.0
Dist. 8: West	18,806	1,348	7.2	1,180	168	12.5	1,952	150	7.7	127	23	15.3
Dist. 9: North	23,221	3,764	16.2	3,274	490	13.0	2,007	312	15.5	283	29	9.3
Dist. 10: Panhandle	4,977	72	1.4	67	5	6.9	538	21	3.9	20	1	4.8
Utah	33	18	54.5	17	1	5.6	4	4	100.0	4	.....	.....
Virginia	4	4	100.0	3	1	25.0	.....	.....	.....	.....	.....	.....
Washington	5	5	100.0	5	.....	.....	2	2	100.0	2	.....	.....
West Virginia	7,968	29	0.4	17	12	41.4	845	11	1.3	8	3	27.3
Wyoming	1,398	160	11.4	119	41	25.6	260	48	18.5	38	10	20.8
Total United States	281,015	32,134	11.4	28,673	3,461	10.8	32,995	4,846	14.7	4,290	556	11.5

* Exclusive of all tests seeking new pay zones or outposts attempting to extend known fields.
[1] Dist. 2 included with Dist. 4. [2] Dist. 5 included with Dist. 6. [3] Dist. 7-B included with Dist. 9. [4] Dist. 7-C included with Dist. 8.



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In this new design Model 45 high energy vibration shale shaker, Link-Belt Engineers have incorporated every possible feature . . . stronger decks, additional screen supports for longer screen cloth life and a flexible design featuring a built-in mud box . . . to give operators the most efficient and economical shale shaker it is possible to build.

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DRILLING HINTS

How To—

Make Clothes Dryer Rack

On many steam rigs, and particularly steam barge rigs, the fireman is troubled with his boilers being cluttered up with the crewmen's clothes which are usually hung near the boilers to dry after washing in the blow barrel or washing machine. On a recently-constructed boiler barge, this problem was effectively solved by providing portable drying racks or frames on which clothes may be hung. The rack was light enough so it could be moved easily if the need arose.

Framework of this clothes drying rack consisted of 1½-inch water pipe supported by four legs which were connected together on the floor by means of an H-brace, also made from 1½-inch pipe. Hooks were welded to the box-shaped top member at regular intervals on the long sides of the frame.

A drying rack was provided for each of the three crews to prevent any mixup in work clothes. They are normally placed between two fired boilers which radiate sufficient heat to dry the wet clothes regardless of the weather.

SEND FOR BULLETIN No. 15

Tells How To SAVE TIME and MONEY installing steel pipe . . under roads etc.

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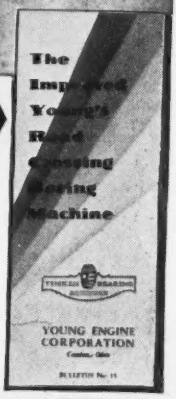

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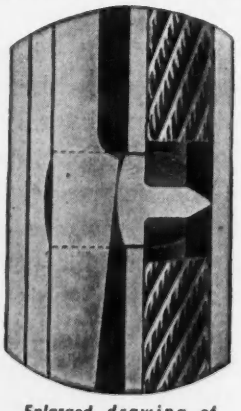
IT CAN BE DONE
with the KINLEY
SAND LINE CUTTING TOOL



Enlarged drawing of section of tool inside tubing, showing tapered wedge forcing knife thru wire line.

Cuts any size wire line up to 11/16" in any size pipe as small as 2" tubing. It cuts the stuck line at the top of the rope socket, thus saving the line as well as the cost of a fishing job.

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In the great oil-producing centers the world over, Spang Cable-System Drilling and Fishing Tools are held in high regard for their "Higher Standards" of efficiency and lasting quality.

Fig. D312—Spang Swivel Rope Socket. Figs. D330, D335—Spang Boxes and Pins. Fig. D360—Spang Straight Drilling Bit. Fig. D322—Spang Weldless Jar. Fig. D328—Spang Drilling Stem. Fig. D368—Spang Twisted Drilling Bit. Fig. D380—Spank Regular Bailer. Fig. F514—Spang Reversible Casing Ripper. Fig. F481—Spang Multi Slip Collar Socket. Fig. F476—Spang Solid Bored Friction Socket. Fig. F460—Spang Center Rope Spear. Fig. F467—Spang Three-Prong Grab. Fig. F482—Spang Full Circle Three Slip Slip Socket. There are many other types of Spang Fishing Tools, not illustrated.

The HIGHER STANDARD

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ON TUBING
AND CASING
WITH Guiberson
TUBING ANCHOR

Tubing won't breathe when the type "AC" anchor holds the tubing string. String cannot be dropped as it is anchored in the hole. Makes pumping smoother and saves tubing joints. Has full area slips with large bypass for fluid and gas. It's ideal for anchoring Guiberson "GW" 2-cup packer—for supporting casing pumps—for all bottom hole tools. Made for 4¾" to 9" casing.

Type "AC" Tubing Anchor

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For complete data, see the Composite Catalog Page 1533, or write to

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Established 1919

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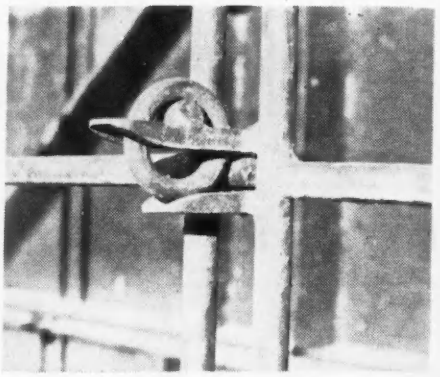
How To—Design Simple, Positive Gate Latch

Two pieces of narrow channel iron are welded to the fence post about one-inch apart at the weld after shaping to resemble a duck's bill. The top piece is cut with a slot long enough to allow a 2½-inch or 3-inch iron ring to pass through the opening. A short 7/8-inch round bar is welded across the slot to retain the iron ring in place. The other part of the latch is a continuation of the horizontal rod in the gate which rests behind the ring when the gate is closed.

Opening of the gate is done by lifting the ring to clear the horizontal bar.



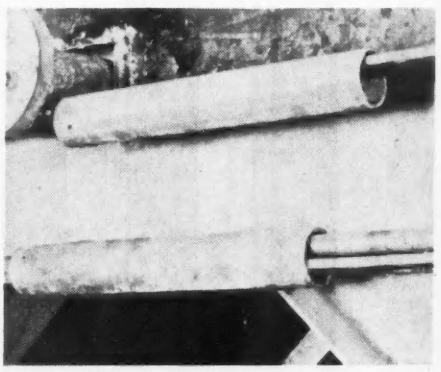
The latch will automatically lock itself when the gate is fully closed.

How To—Support Conduit and Pipe on I-Beams

Conduits carrying wires and pipe lines distributing water, air or electrical power to various parts of the rig can be easily supported on the horizontal flanges of I-beams through the use of split pipes to eliminate tack-welding and brackets.

Short nipples of appropriate size pipe are split longitudinally with a smooth cut either on a lathe or with a cutting torch. The conduit or pipe is fed through the split holder and the latter sprung to straddle the flange of the I-beam or structural steel so that the conduit or piping is held on top of the flange.

Various lengths and sizes of pipe can be used for this purpose and provide a simple and convenient mounting device. They may be easily removed by prying the split holder from the I-beam.



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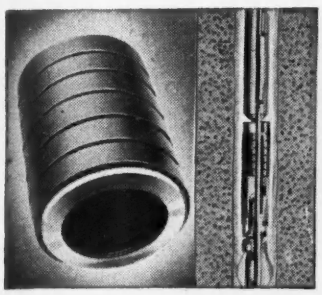
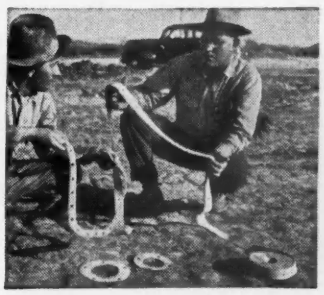
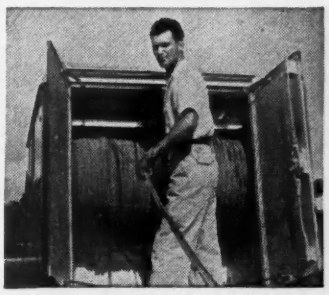


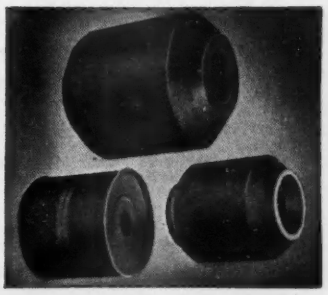
...for packing



...for gaskets



...for jacketing



...for many uses

MAKERS of oil field equipment specify neoprene for their tough jobs. And there's a reason! Neoprene compounds have solved hundreds of difficult problems for them.

These successful manufacturers have found that a rubber part must have not just one good characteristic, but *all* the characteristics required for a given service. For instance, a pipe protector must be abrasion-resistant, must withstand oil and must have low permanent set. One poor characteristic might make the part useless.

Of course no one expects maximum values of *every* property in any single compound—but users can obtain the correct *balance* of properties from a neoprene compound. This means the one or two most important characteristics will be the best that can be obtained, and all the needed secondary characteristics will be satisfactory for the service. It's this *balance* of properties which has made neoprene one of the most useful materials in oil field equipment design for 15 years.

So next time you need rubber goods—hose, packers, valve cups, piston rubbers, casing guards, tubing strippers, pump cups, seals, cable jackets, belting, diaphragms—be sure to specify neoprene, the rubber that's been proven in oil field service.

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Here's Why Neoprene DOES SO MANY JOBS SO WELL!

- ★ High tensile strength, resilience, low permanent distortion.
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With New, Improved, Reinforced Non-Spreading Mouth

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		1 Swivel	Wt. Each
MIDGET	No. 1	¼" chain	2¼ lbs.
DELTA	No. 1	⅜ or ⅜" chain	6½ lbs.
		Two Swivels	Wt. Each
DIXIE	No. 1	⅛ or ½" chain	10 lbs.
LONE STAR	1	⅛, ½ or ⅝" chain	14 lbs.
LONE STAR	2	⅛, ½ or ⅝" chain	17 lbs.

LOAD BINDER — DROP-FORGED
Heat Treated • 2 Sizes

Two Swivels
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Write for Free literature giving pertinent information on these dependable power units.

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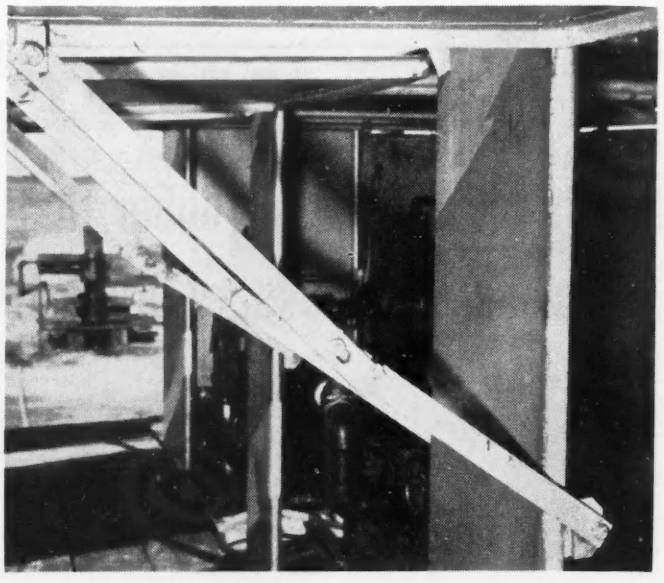
How To—Brace Hinged Door on Pump Skid



Hinged arms with an "elbow" joint midway of their length, are used by one contractor to support the steel door panels of his unitized pump skid. The arms are pivoted to permanent panels in the unit, and also bolted loosely to the hinged panels at points the same distance from the hinges as are the fixed support pivots.

To hold the doors open, they are simply raised high enough to extend the arms. When fully extended, a pin on the upper end unit engages a notch in the lower member, effectively locking the support in place, even against heavy wind force. To close the doors, they are raised enough to take the load off the locking pins, and the center is then "broken" upward to permit the arm to begin folding as the door panel is lowered. When the door is lowered, the two halves of the supporting device extend upward from their pivot points, and lie along the upright without requiring space within the skid.

A slot in the upper half of the device enables it to slide along the central hinge bolt, and thus compensates for any slight variation in center distances or warping of the door unit.

How To—Eliminate Steam Throttle Vibrations

To relieve the throttle of any vibration from the steam line, one contractor welds a transverse header into the engine skid, just inboard from the end member of the skid unit. This header is bull-plugged on both ends and is welded to the webs of both skid beams to form a rigid setting. A nipple and union provide connection for the line to the throttle. A second nipple, set horizontally, carries the union and ell tying the header into the riser from the separator, set on a shelf in the substructure below.

A setting such as the one illustrated makes the steam connection to the engine short, and permits it to be rigidly fixed so that it cannot impose heavy strains on engine fittings through either vibration or expansion changes.

When the engine is to be moved, the only union to be broken is the one on the horizontal nipple. This enables the line from the steam separator to be

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ECONOMICAL • EASY TO INSTALL
GIVES YEARS OF SERVICE

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the tape that speeds measuring in oil fields

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The ideal tape for measuring casing standing in a derrick. Has hook at end of line for setting on pipe. Heavy line is jacketed in smooth, hard chrome—will not crack, chip or peel. Jet black markings are easy to read, recessed so they can't wear out. 4-arm frame with large winding handle. Get the best—order the Lufkin "Derrick" through your supply house. For free catalog write THE LUFKIN RULE CO., SAGINAW, MICH., New York City.

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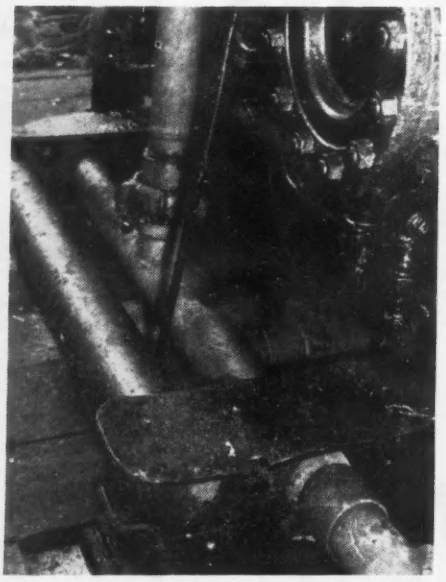
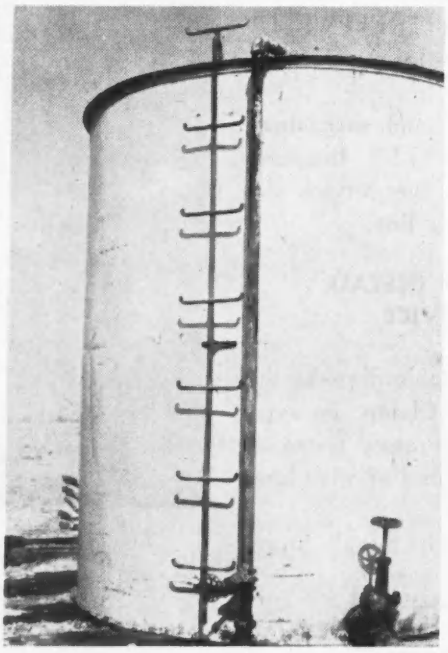
DRILLING HINTS



swung clear of the engine skid. The riser from header to throttle is left intact except when the throttle must be overhauled.

How To—

Make a Tank Ladder



Instead of welding a ladder permanently to the side of water or mud storage tanks to take a beating and to become distorted when moving, one company supplies its rigs with a single, light weight all steel ladder which can be moved quickly from one tank to another when the contents are to be observed through the open top. A single rod of heavy bar steel is used for the frame and is bent at the top into a "shepherds crook" which slips over the top edge

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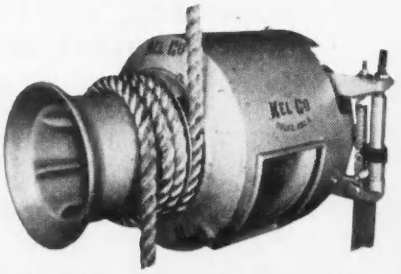
TULSA'S LARGEST FINEST HOTEL

THE MAYO

KELCO MODEL 16

NON-FOULING CATHEAD



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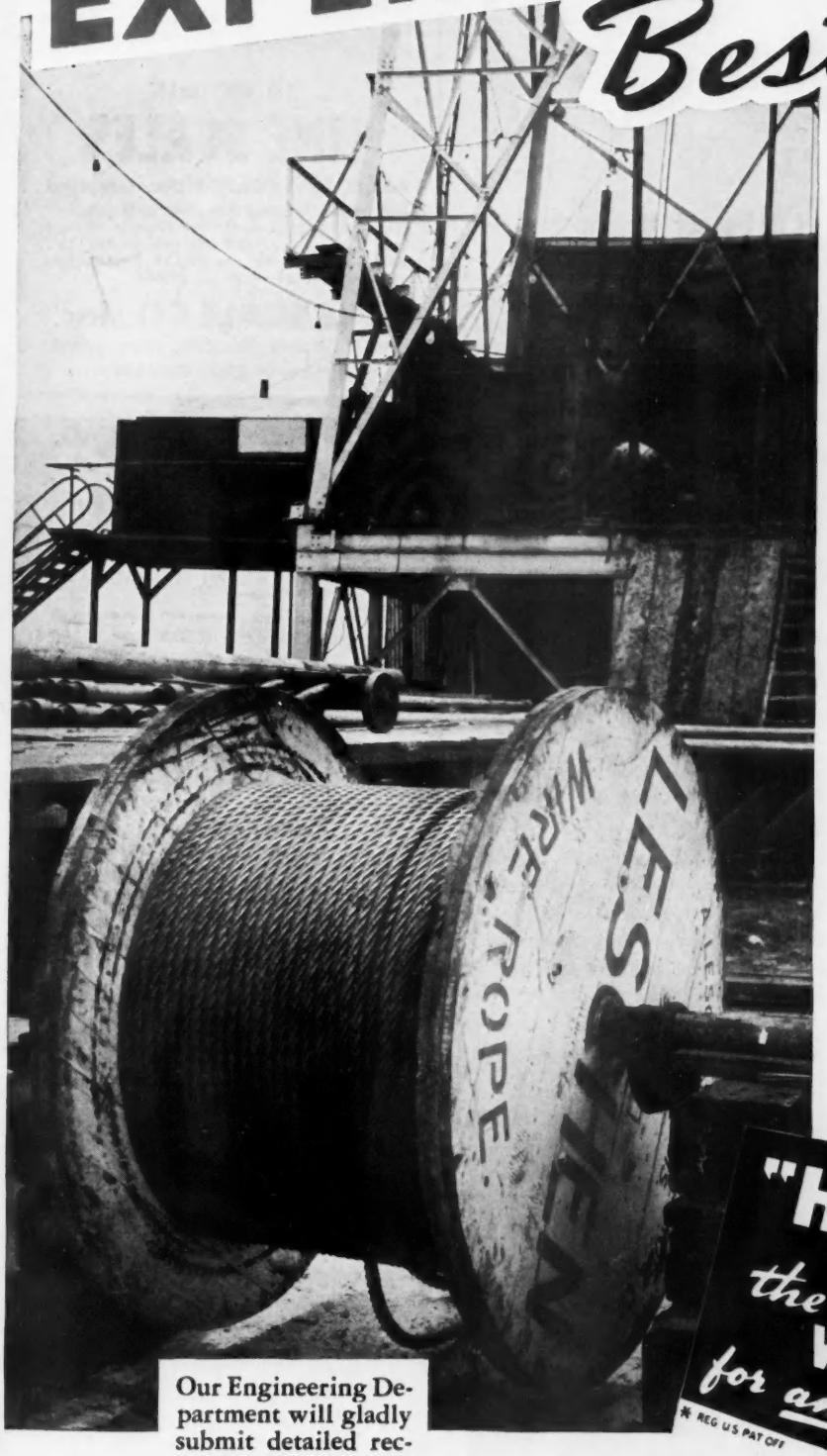

Men who operate Oil Field equipment, need not be reminded of the important part that wire rope plays in determining their final production costs.

Experience has proved that the longer a rope lasts, the lower is its cost per unit of work done. Less time, too, is wasted in making replacements.

It is *also the experience* of a large number of Wire Rope users that they can depend on Preformed "HERCULES" (Red-Strand) Wire Rope for top-flight performance. Its toughness . . . its easy spooling . . . its unusual endurance — make for longer life, faster work, and lower operating cost.

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DRILLING HINTS

of the tank. Two wide spread, "U" shaped brackets are welded to the rod on the inner side as spacers to keep the ladder the desired distance from the tank. At convenient intervals from the base to the top, the rungs are attached, made of round steel and tipped up slightly at each end to prevent feet from slipping when wet.

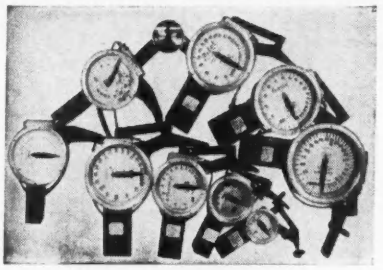
How To—

Build All-Steel Piers

Steel pipe derrick piers have been used by a number of companies and drilling contractors with varying success, but the pier illustrated has features not seen on many types in use. Many all-steel piers have flat boiler plate tops and bases, usually left unfinished so that sharp edges and corners protrude to form a safety hazard.

The base and cap for this pier are made of wide channel iron, mitered and welded to form boxes. The top plate being solid, but the lower plate having a square opening between the sides and ends of the channel iron members. Only the corners need dressing down to remove uneven parts while the sides are the original mill rolled surface which is commonly smooth will not cut when bumped into.

With a light rig erected on hard ground, the surface of the lower plate is sufficient to support the structure without laying a timber mat. If a timber mat is required, the bearing surface of the lower plate is large enough to distribute the weight over a wide area so that breaking of the wood is eliminated.



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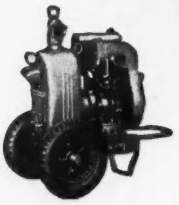

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How To—

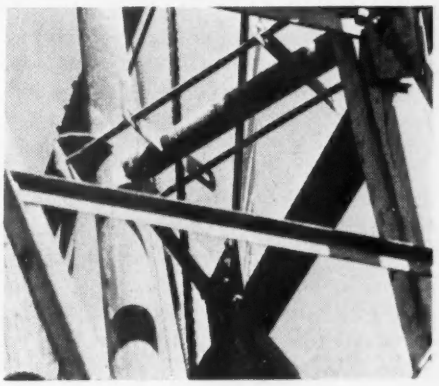
Mount Rig Gas Meter

The two-inch pipe usually laid to carry field gas to a rig boiler battery is not rigid enough to support a meter without danger of overloading a joint or possibly causing a break through vibration of the unit.

One producer provides a mount for measuring rig fuel use which is easily placed and as readily removed. The support consists of a four-foot piece of heavy two-inch pipe, to each end of which is welded an 18-inch length of the same material. Each end of the cross pieces has welded to it a similar length, so placed as to form feet for the unit.

To set up in muddy ground, the four feet are placed on the ground, and then "bumped" down to a bearing with a short length of heavy timber. When the legs have reached the desired bearing in the ground, the meter is clamped midway of the four-foot piece, and connections made to an orifice flange cut into the fuel line by means of flexible copper leads.

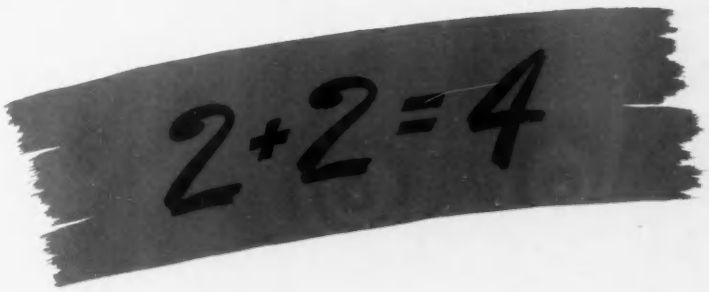
The same mount is used on hard ground, the four feet being turned over to project upward and short timbers being placed under the cross members to form supports. In either case, the fuel line is free to vibrate or shift without placing strain on the meter or affecting the recording of the chart pen.



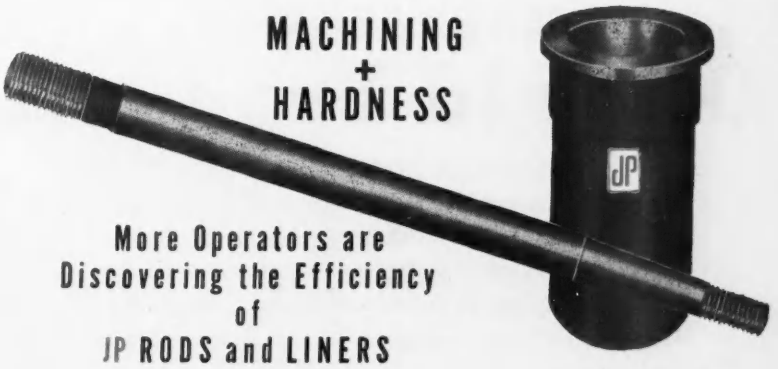
How To—

Brace Derrick Standpipe

Continuous vibration of the standpipe will probably loosen connections or break them. Adequate bracing of this pressure line that is subject to pulsations is a problem when the line is not ad-



Simple arithmetic applies to rods and liners too. Excellent materials plus excellent workmanship, testing and hardening methods pay off with excellent results!



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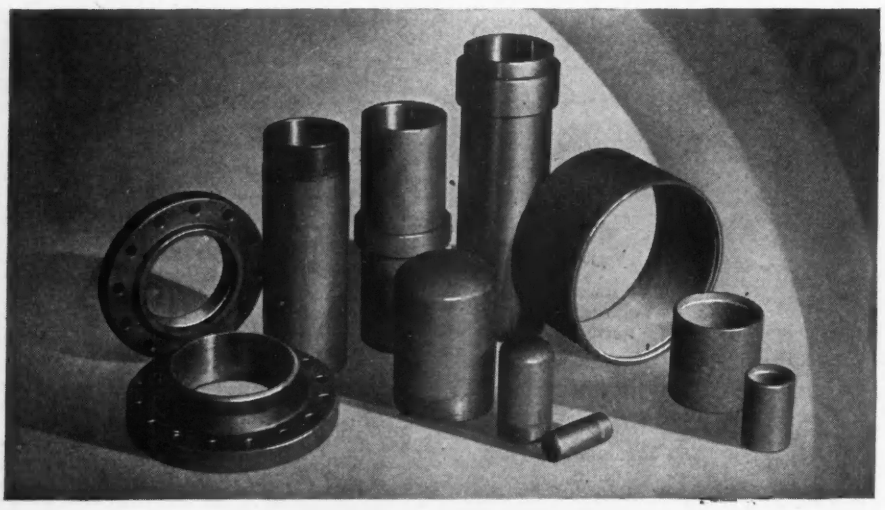
jacent to the derrick leg where it can be bolted to the angle iron leg.

This problem was solved in a rather unique manner employing salvaged pipe. A short nipple of 2½- or three-inch pipe is cut just long enough to span the distance between the derrick leg and standpipe. The respective ends are shaped to fit the pipe and the angle iron leg.

A saddle is cut from discarded angle bracing to fit the curvature of the standpipe and two holes are cut in each end. Through these holes are inserted long rods which are anchored at the derrick leg. The rods are maintained in alignment by two double side arms which are slotted to accommodate the rod. When it is desired to anchor the standpipe to the derrick, these bolts are tightened. If the rig is to be removed, this supporting arm is removed. At little expense, much of the vibration in the standpipe has been eliminated by this simple brace.



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How To—

Release Manifold Pressure

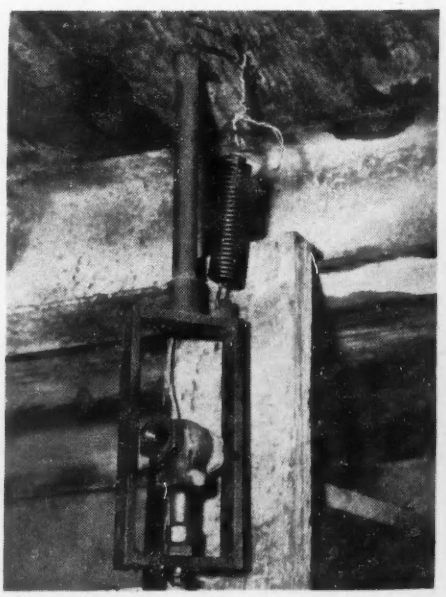
When the drilling rig engine stalls due to overload and it is necessary to shift to a lower gear ratio, steam trapped in the manifold can cause trouble unless the built-up pressure can be released.

One contractor devised a relief valve which was controlled from the driller's stand. The valve was made from a globe valve on which the bonnet threads on the stem had been ground away. The valve was then installed on the line so that steam pressure tended to hold the valve on its seat.

A yoke was placed over the valve, with the stem through a hole in the lower end and the former handwheel nut then tightened in place. A coiled spring held the weight of the yoke off the valve stem and assisted in holding the valve in closed position.

The round rod at the top of the yoke extended an inch up through the floor, and so located as to be within reach of the driller's right foot. To release manifold pressure, the driller stepped on the end of the yoke, forcing it down against the pull of the spring, and thus opening the valve. Release of weight on the yoke allowed the spring to close the valve, with steam pressure again assisting in maintaining the seal.

The unit also acted to permit live steam to be blown through the manifold to clear away condensation before it could reach the valve chambers of the engine.



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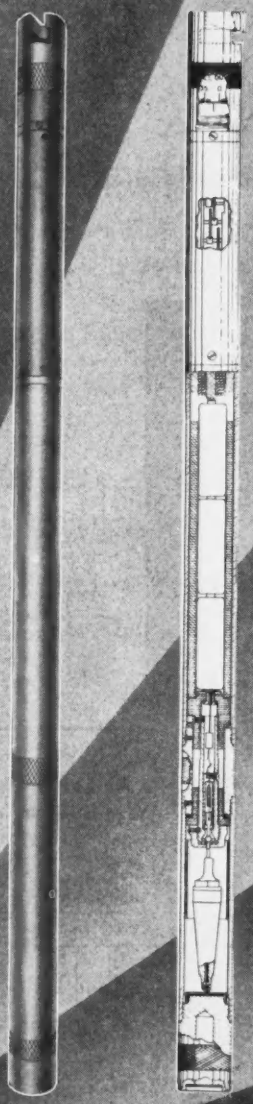

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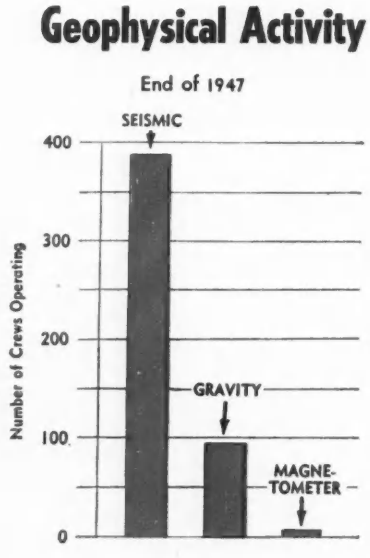
Geophysical Activity Increased As Year Begins

A TOTAL of 529 geophysical and core drilling crews were known to be actively engaged in the search for possible oil- and gas-bearing structures in the U. S. at the close of 1947, according to statistical reports of the Interstate Oil Compact Commission.

This compared with 418 prospecting crews shown by the same source to have been in operation at the end of 1946. However, statistics for 1947 are more complete than in the preceding year, and comparison therefore means little.

Of the total at the end of the past year, 491 were geophysical crews and 38 were core drilling units. South Louisiana was the most active area, having 80 geophysical crews working on the last day of the year. West Texas ranked second with 61 geophysical crews, followed by Southwest Texas with 56 geophyiscal crews and 1 core drilling crew. Then came Oklahoma with 44 geophysical crews and 8 core drills, Southeast Texas with 49 geophysical crews, Mississippi with 29 geophysical crews and 5 core drill crews, and North Louisiana with 25 geophysical crews.

Most of the geophysical work was being done by seismic parties, which was the only type of prospecting operation to show an increase during the year. There were 388 seismic crews working at the end of last December. South Louisiana had the largest number, its 65 seismograph crews comparing with 50 in West Texas, 49 in Southwest Texas, 42 in Oklahoma and 38 in Southeast Texas.



Next in prominence was the gravity meter, with 96 crews operating as compared with 95 a year ago. Again South Louisiana was the site of the largest number of crews, indicating how intensive a search for new fields was being made in this region. There were 15 gravity crews active in South Louisiana on the last day of the year.

The number of magnetometer crews decreased from 21 a year ago to 7 at the end of 1947.

There were no torsion balance crews active at the end of the year.

Oklahoma was the most active core drilling area with 8 crews.

Geophysical and Core Drilling Activity End of 1947 and 1946

(Figures represent number of crews)

STATE	Seismic		Gravity		Magneto-meter		Total Geophysical		Core Drill		Total Geophysical and Core Drill	
	1947	1946	1947	1946	1947	1946	1947	1946	1947	1946	1947	1946
Alabama	2	5	3	6	0	1	5	12	4	3	9	15
Arkansas	9	9	4	1	3	1	16	11	2	1	18	12
California	13	14	0	2	0	0	13	16	0	0	13	16
Colorado	5	8	7	9	0	3	12	20	0	0	12	20
Florida	0	2	1	3	0	1	1	6	2	4	3	10
Georgia	0	1	0	1	0	1	0	3	0	0	0	3
Illinois	6	n.a.	1	n.a.	0	n.a.	7	n.a.	2	n.a.	9	n.a.
Indiana	2	0	0	0	1	0	3	0	3	0	6	0
Kansas	4	1	2	0	0	0	6	1	5	7	11	8
Louisiana (North)	17	n.a.	8	n.a.	0	n.a.	25	n.a.	0	n.a.	25	n.a.
Louisiana (South)	65	27	15	12	0	0	80	39	0	0	80	39
Michigan	0	0	0	0	0	0	0	0	4	5	4	0
Mississippi	22	31	6	8	1	2	29	41	5	5	34	46
Montana	4	1	0	1	0	0	4	2	0	0	4	2
Nebraska	2	1	0	1	0	0	2	2	0	0	2	2
New Mexico	10	10	3	19	2	7	15	36	0	0	15	36
North Dakota	1	1	0	0	0	0	1	1	0	0	1	1
Oklahoma	42	25	2	3	0	0	44	28	8	12	52	40
Texas (East)	17	12	3	5	0	0	20	17	2	5	22	22
Texas (Southeast)	38	n.a.	11	n.a.	0	n.a.	49	n.a.	0	n.a.	49	n.a.
Texas (Southwest)	49	40	7	3	0	0	56	43	1	1	57	44
Texas (West)	50	41	11	8	0	5	61	54	0	7	61	61
Utah	3	4	0	4	0	0	3	8	0	0	3	8
Wyoming	27	18	12	9	0	0	39	27	0	0	39	27
Total	388	251	96	95	7	21	491	367	38	51	529	418

Oklahoma, Kansas and South Louisiana data for 1946 incompleted even when figures are listed. n.a. indicates data not available.
Source: Interstate Oil Compact Commission.

Industry to Equip 18,525 Wells With Pumping Equipment

DURING 1948, the industry will equip 18,525 oil wells with lifting equipment. This total includes surface units, down-the-hole units of all types, and wells put on air/gas lift. The total or 1948 exceeds the number of wells put on the pump (including air/gas lift) during 1947 by 11.5 percent, or 1906 units.

The figures given in the tabulation are those arrived at for each state or district after evaluating many factors. Among these are the anticipated pumping unit requirements as supplied by companies throughout the areas listed; the trend towards or away from pumping as against flowing in an area, as indicated by the figures on both classes of wells for 1947; and the probable number of new oil wells which will be added to the area during 1948 as a result of the drilling program announced for that area.

50 Percent Gain

A survey of the manufacturers of individual pumping units and pumping jacks, made by WORLD OIL in January and covering all concerns in the U. S. which manufacture such equipment, indicates that deliveries on pumping units and jacks in 1947 increased nearly 50 percent over the previous year, in excess of 15,000 being actually delivered during the year. Of the 15,200 units delivered, nearly 14,000 were individual pumping units. The survey indicates that there is sufficient manufacturing capacity to increase the output substantially this year.

Replying to the question as to capacity, manufacturers indicated they could produce 5000 additional pumping units alone, provided they could get adequate steel and manpower. Jack capacity easily could be stepped up by a large percentage. The survey covered only surface pumping units. Other types, such as air/gas lift, hydraulic and other down-the-hole units, also played an important part in lifting oil during the year.

Of the companies who responded by

Estimate of 1948 Pumping Equipment Needs

(Includes requirements for all types of pumping units and also air/gas lift units)

STATE OR DISTRICT	Oil Wells Completed In 1947	Wells Put On Pump Or Lift In 1947	Estimated Number Wells To Go On Pump or Air/Gas Lift During 1948	Number of Flowing Wells End of 1947	Net Number of Wells Abandoned During 1947	Estimated Average Number Pumping Wells To Be Maintained During 1948	Estimated Maintenance Cost (Equipment Only) For All Pumping Wells in 1948
Arkansas	174	173	195	378	91	3,089	$ 278,000
California	1,554	1,270	1,456	2,363	431	23,520	8,585,000
Colorado	156	158	104	127	12*	463	44,000
Illinois	1,071	1,091	1,050	68	1,594	28,950	2,258,000
Indiana	291	293	285	2	361	2,949	177,000
Kansas	1,287	1,308	1,300	85	1,601	27,496	2,475,000
Kentucky	293	296	274	0	408	15,646	1,127,000
Louisiana	924	1,008	1,308	3,168	1,335	5,070	539,000
North Louisiana	547	442	558	925	721	3,657	384,000
South Louisiana	377	566	750	2,243	614	1,413	155,000
Michigan	320	285	384	276	163	3,458	337,000
Mississippi	290	182	202	416	24	737	111,000
Montana	150	152	174	24	270	2,629	289,000
New Mexico	397	164	173	3,636	35	1,482	356,000
New York	1,119	1,119	1,050	0	344	23,525	823,000
Ohio	307	322	322	50	404	22,986	1,034,000
Oklahoma	1,964	1,991	2,080	1,485	1,054	51,425	4,885,000
Pennsylvania	1,269	1,269	1,189	0	1,467	83,394	2,919,000
Texas	5,617	5,260	6,632	37,070	1,799	73,042	13,728,000
Dist. 1: South Central	176	85	85	208	160	3,100	372,000
Dist. 2: Middle Gulf	368	201	241	2,723	85	954	134,000
Dist. 3: Upr. Gulf Coast	447	509	768	4,920	286	3,854	463,000
Dist. 4: L. Gulf S. West	582	335	375	3,854	335	5,335	720,000
Dist. 5: East Central	60	47	42	342	65	1,365	205,000
Dist. 6: Northeast	285	852	1,087	14,187	477	11,835	2,189,000
Dist. 7-B: North Central	385	274	328	760	298	6,454	1,010,000
Dist. 7-C: West Central	202	168	291	186	61*	2,550	382,000
Dist. 8: West	1,696	1,205	1,649	8,855	220*	10,791	5,342,000
Dist. 9: North	1,133	1,397	1,444	986	220	20,365	2,138,000
Dist. 10: Panhandle	293	187	322	49	154	6,439	773,000
West Virginia	108	108	115	0	309	17,057	853,000
Wyoming	170	150	210	247	33	4,010	481,000
Other States[1]	17	20	22	4	18	170	21,000
Total United States	17,478	16,619	18,525	49,399	12,329*	391,188	41,320,000

[1] Other States include: Alabama, Florida, Missouri, Nebraska, Tennessee, Utah and Virginia.
* State so marked showed more shut-in wells put on production than total abandonments. Total indicates net abandonments after deduction for inactive wells again on production.

U.S. Crude Production

Certain to Hit Another All-Time Peak

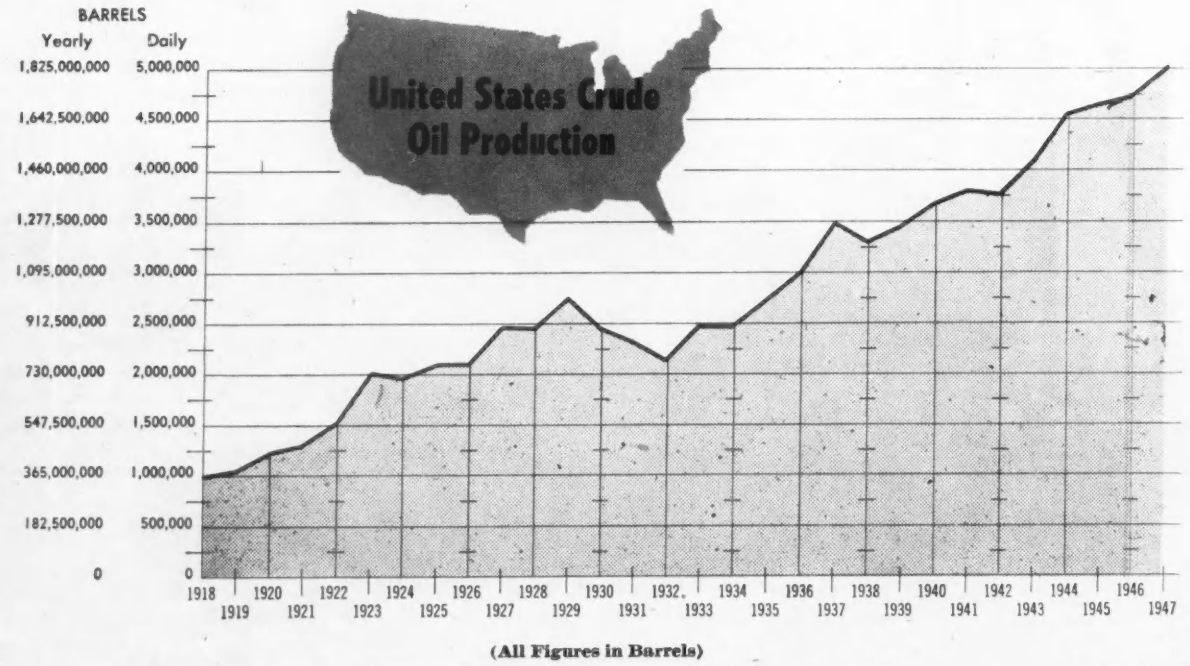
PRODUCTION of crude oil in the U. S. during 1947 rose to a height substantially larger than ever before, and another new all-time peak seems assured for 1948.

In response to the unusually large growth in consumption, the country's crude output during 1947 registered one of its biggest annual increases in history, sending daily average yield above 5 million barrels for the first time. With consumption in 1948 expected to be even higher, there is every indication that another sharp gain in volume of crude produced will be recorded this year. It appears probable that daily production may average 5,325,000 barrels to boost the annual total to a level not far beneath 2 billion barrels. Limited capacity of wells and of transportation and refining facilities, will restrict output to near this rate, otherwise an even greater quantity would no doubt be produced.

Sharp Gain in 1947

The volume of crude produced in the U. S. in 1947 amounted to an annual total of 1,853,166,000 barrels, a gain of 120 million barrels or 6.9 percent over the preceding peak of 1,733,424,000 barrels recovered from wells during 1946. The year's output was equal to a daily average yield of 5,077,100 barrels, which was 328,000 barrels more than the 4,749,100 barrels produced per day in the preceding year. In only four years has the annual rate of growth been greater than the gain registered the past year.

In contrast with earlier years, present production levels reflect an amazingly large increase. The 1947 record yield was more than 1¼ million, or 32 percent,



(All Figures in Barrels)

YEAR	Yearly Total	Daily Average	YEAR	Yearly Total	Daily Average	YEAR	Yearly Total	Daily Average
1918	355,928,000	975,000	1928	901,474,000	2,469,000	1938	1,214,355,000	3,327,000
1919	378,367,000	1,037,000	1929	1,007,323,000	2,760,000	1939	1,264,962,000	3,466,000
1920	442,929,000	1,213,000	1930	898,011,000	2,460,000	1940	1,353,214,000	3,707,000
1921	472,183,000	1,294,000	1931	851,081,000	2,332,000	1941	1,402,228,000	3,842,000
1922	557,531,000	1,528,000	1932	785,159,000	2,151,000	1942	1,386,645,000	3,799,000
1923	732,407,000	2,007,000	1933	905,656,000	2,481,000	1943	1,505,613,000	4,124,900
1924	713,940,000	1,956,000	1934	908,065,000	2,488,000	1944	1,677,904,000	4,584,400
1925	763,743,000	2,092,000	1935	996,596,000	2,730,000	1945	1,713,655,000	4,694,900
1926	770,874,000	2,112,000	1936	1,099,687,000	3,013,000	1946	1,733,424,000	4,749,100
1927	901,129,000	2,469,000	1937	1,279,160,00	3,505,000	1947	1,853,166,000	5,077,100

Source: U.S. Bureau of Mines, except for latest year, which has been calculated with aid of Bureau statistics for first 10 months and American Petroleum Institute weekly reports for last two months.

greater than the prewar peak of 3,842,000 barrels produced daily in 1941, and was twice the quantity produced as recently as 1934.

Even this record-breaking quantity of production, assisted by a greater volume of imported oil, was not sufficient to satisfy swiftly rising demand requirements, and U. S. stocks of all oils dropped 14 million barrels during the year, of which 3 million barrels were crude oil and 11 million barrels were refined oils.

More Needed in 1948

Every sign points to the production of a greater amount of crude during 1948 than in 1947. In the first place, demand for U. S. petroleum products in 1948 is generally expected to be about 5 to 6 percent greater than during 1947. Secondly, above-ground stocks of oil are at such low levels as to necessitate that current production be depended upon to supply demand. Stocks actually need to be increased, but it is doubtful if the industry will be able to achieve this due to demand exceeding pipe line and refining capacities. Thirdly, the burden of supplying this additional oil will fall mainly upon the domestic producing industry, since only a very small increase in imports of foreign produced oil can be anticipated because of the limited availability of tankers.

At the close of last year, wells in the U. S. were producing at a much higher level than the year's average, starting 1948 off at a pace ahead of the preceding year. Production the past December averaged 5,274,100 barrels daily compared with the average of 5,077,100 barrels per day for the full year.

With some additional pipe line and refining capacity to be completed during coming months, with the higher crude prices now posted offering an incentive to keep stripper wells and other costly wells operating, and with every producible barrels in ready demand, production can be expected to rise above the year-end level. Therefore, it is herewith estimated that output in 1948 is likely to average 5,325,000 barrels per day to total about 1,950,000,000 barrels for the year. This would require an increase only slightly less than the gain made in 1947 over the preceding 12 months. Only limited facilities and limited producing ability will hold the producing rate down to this level.

The foregoing estimate for 1948 domestic crude production to average 5,325,000 barrels per day is larger than the forecast of the U. S. Bureau of Mines. The bureau's latest forecast, prepared last November, predicted a domestic crude demand of 5,290,000 barrels per day (1,936,200,000 barrels annually) for the year. This was after allowing for a very small increase in imports and was based on a demand only 4.8 percent higher than in 1947. Bureau forecast figures have usually proved to be on the conservative side, and it appears probable that this will be true of its 1948 prediction.

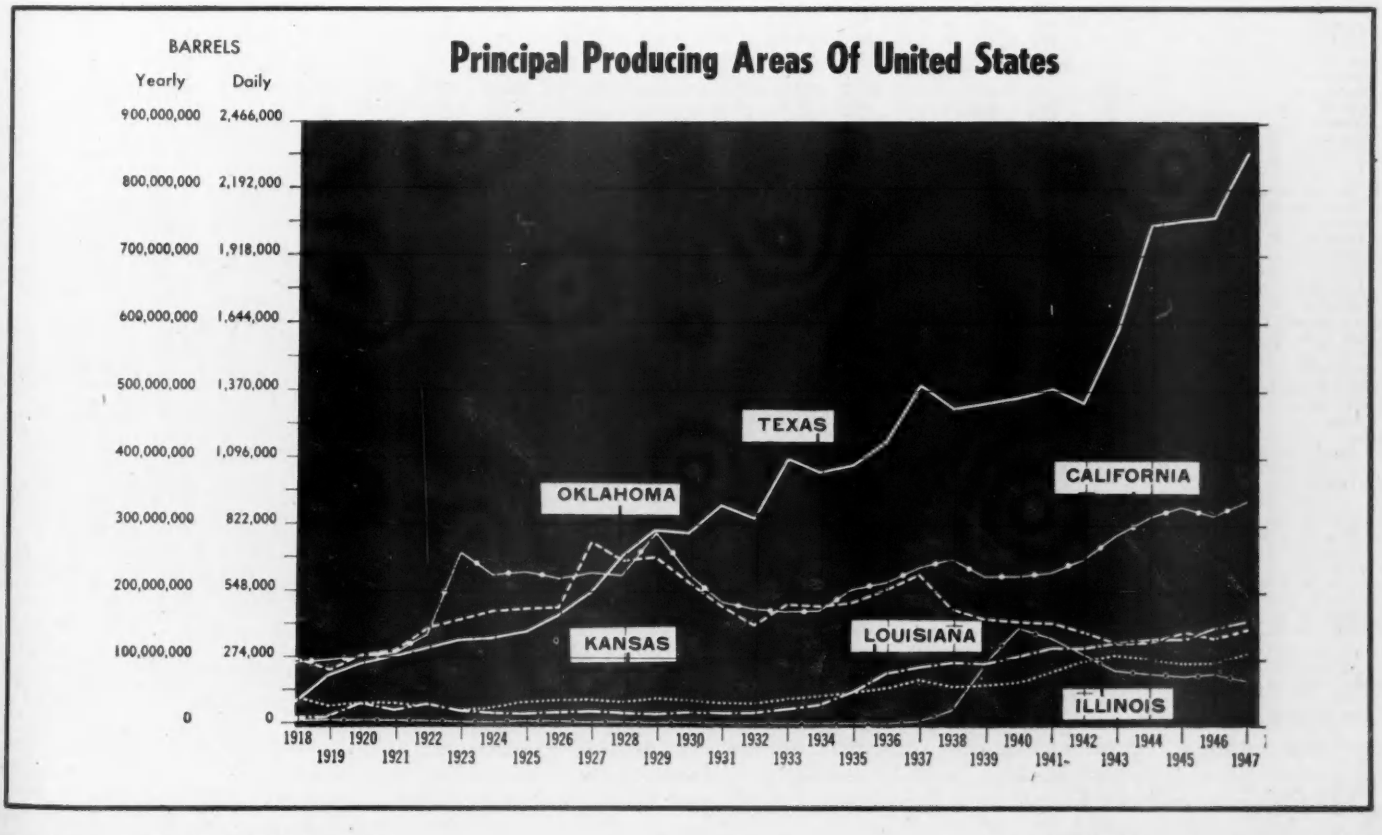
The Economics Advisory Committee of the Interstate Oil Compact Commission sees the need for building up stocks in 1948 in view of larger demands and has estimated that consumption will be 6 percent higher than in 1947. To increase stocks by about 50,000 barrels daily during the year and at the same time meet enlarged demand, this committee has forecast that a domestic crude oil production of 5,385,000 barrels daily will be required.

Five States Produce Most Oil

Although 26 states produce oil, the five largest producing states (Texas, California, Louisiana, Oklahoma and Kansas in this order) again accounted for 84 percent of the nation's crude production. These same states were largely responsible for the growth which occurred in production the past year, each producing more than in 1946. The combined output of these five states averaged 4,265,300 barrels per day during 1947, up 290,700 barrels over their daily average during the preceding year and thus accounting for most of the 328,000 barrel daily increase recorded for the whole nation.

These same five states are certain to be the chief contributors of whatever increase occurs during 1948. During last December the five states were producing an aggregate of 4,523,900 barrels, an increase of 258,600 barrels over their average for the full year. This was in contrast with a national increase of only 197,000 during the same period, indicating that the country is becoming more and more dependent on its foremost prolific regions for the additional oil it needs.

Among the individual states, Texas was far in the lead, producing 44 percent



of all the crude oil produced in the U. S. during 1947. This state yielded an average of 2,241,100 barrels daily (817,987,000 barrels annually) during 1947, thus contributing 157,500 barrels more than in 1946 or almost half of the gain recorded by the nation.

Most of the increased output anticipated during 1948 assuredly will come from Texas, where production in December of 2,348,600 barrels daily was 107,500 barrels more than its average daily yield for the year.

Although eight of Texas' ten oil-producing regions produced more in 1947 than in the previous year, the most important factor in the state's larger yield was a very large gain in the West Texas district. The latter area produced an average of 564,300 barrels daily the past year, which was 70,000 more barrels than its 1946 daily average output. West Texas's production last year was nearly 2½ times greater than the 235,600 barrels it produced per day in 1941.

Unquestionably, West Texas will produce an even larger amount in 1948. Most of the nation's increased yield will come from this important oil area. By the last month of 1947, the region already had boosted its daily average producing rate to 648,700 barrels, 85,000 barrels above its average for the year 1947. Completion of some additional pipe line outlets now under construction will make it possible for West Texas to enlarge its production further, but not by any substantial amount until 1949.

Increases in other Texas regions were comparatively small. Second largest producing area in Texas was the Upper Gulf Coast (District 3), which produced an average of 479,000 barrels per day last year, or 21,000 barrels more than in 1946. The Lower Gulf Coast (District 4) increased its output 23,100 barrels daily in producing an average of 241,000 barrels.

Only minor gains in production were recorded in other Texas districts, while the East Central and Northeast districts were experiencing very small decreases.

The big volume produced by Texas in 1947 raised its cumulative recovery since it began producing in 1897 to 11¼ billion barrels, equivalent to one-third of all the oil that has been produced in the U. S.

California easily retained its position as the second ranking oil-producing state. Output of the West Coast state totaled 332,958,000 barrels for the year, a daily average of 912,000 barrels which was 48,000 barrels, or 5.6 percent, more than its 1946 production. It is problematical whether California can produce much more in 1948, although it was producing 10,000 barrels more per day in December than its average of the full year.

The third ranking oil state, Louisiana, increased its daily average production by 44,000 barrels in producing 436,400 barrels per day last year. Louisiana probably will do better in 1948, as indicated by its December yield having been 17,000 barrels greater per day than its average for 1947.

Oklahoma followed with a daily average production of 387,200 barrels for the year, which constituted a gain of 18,700 barrels. At the end of the year, Oklahoma's producing rate had risen to 410,400 barrels daily.

Kansas, the fifth big state, increased its daily production by 21,500 barrels over 1946, producing 287,900 barrels per day.

U. S. Crude Production, by States and Districts, December and Years, 1941, 1946, and 1947

From U. S. Bureau of Mines, except November and December, 1947, estimated from A.P.I. weekly reports, and breakdown of Louisiana and Texas by districts based on various sources.

(THOUSANDS OF BARRELS)

STATE OR DISTRICT	PRODUCTION IN DECEMBER: Monthly Total in December				PRODUCTION IN DECEMBER: Daily Average for December			PRODUCTION DURING YEAR: Year Total			PRODUCTION DURING YEAR: Daily Average for Year				Year's Prod. in 1947 as Percent of U.S. Total	Cumulative Prod. To End of 1947	
	1941	1946	1947	% Diff. '46-'47	1941	1946	1947	1941	1946	1947	1941	1946	1947	% Diff. '46-'47		Thousands of Barrels	As Percent of U.S. Cum.
Alabama	.....	29	41	+ 41.4	.....	0.9	1.3	.....	380	398	.....	1.0	1.1	+ 10.0	0.02	1,002	0.01
Arkansas	2,304	2,458	2,483	+ 1.0	74.3	79.3	80.1	26,327	28,375	29,609	72.1	77.7	81.1	+ 4.4	1.60	702,987	2.01
California	19,590	27,257	28,746	+ 5.5	631.9	879.3	927.3	230,263	315,179	332,958	630.9	863.5	912.2	+ 5.6	17.97	7,619,267	21.72
Colorado	200	1,183	1,425	+ 20.5	6.5	38.2	46.0	2,150	12,016	15,766	5.9	32.9	43.2	+ 31.3	0.85	82,466	.24
Florida	.....	9	23	+155.6	.....	0.3	0.7	.....	57	260	.....	0.2	0.7	+250.0	0.02	363	.....
Illinois	12,192	6,105	5,483	— 10.2	393.3	196.9	176.9	132,393	75,297	66,440	362.7	206.3	182.0	— 11.8	3.59	1,314,960	3.75
Indiana	615	558	564	+ 1.1	19.8	18.0	18.2	7,411	6,726	6,092	20.3	18.4	16.7	— 9.2	0.28	173,351	.49
Kansas	7,957	8,400	8,816	+ 5.0	256.7	271.0	284.4	83,242	97,218	105,072	228.1	266.4	287.9	+ 8.1	5.67	1,779,101	5.07
Kentucky	394	823	861	+ 4.6	12.7	26.5	27.8	4,762	10,578	9,469	13.1	29.0	26.0	— 10.3	0.51	224,333	0.64
*Louisiana	10,948	12,822	14,050	+ 9.6	353.2	413.6	453.2	115,908	143,303	159,276	317.6	392.6	436.4	+ 11.2	8.60	1,978,549	5.64
North Louisiana	2,238	2,899	3,353	+ 15.6	72.2	93.5	108.2	24,991	30,768	36,432	68.5	84.3	99.8	+ 18.4	1.97	743,279	2.12
South Louisiana	8,710	9,923	10,697	+ 7.8	281.0	320.1	345.0	90,917	112,535	122,844	249.1	308.3	336.6	+ 9.2	6.63	1,264,701	3.61
Michigan	1,759	1,363	1,503	+ 10.3	56.7	44.0	48.5	16,359	17,074	16,283	44.8	46.8	44.6	— 4.7	0.88	273,101	0.78
Mississippi	2,185	2,599	3,445	+ 32.6	70.5	83.8	111.1	15,327	24,216	35,163	42.0	66.4	96.3	+ 45.2	1.90	162,252	0.46
Missouri	4	4	5	+ 25.0	0.1	0.1	0.2	47	51	55	0.1	0.1	0.2	+100.0	.....	453	.....
Montana	683	699	769	+ 10.0	22.0	22.5	24.8	7,526	8,801	8,700	20.6	24.1	23.8	— 1.2	0.47	141,576	0.40
Nebraska	169	15	16	+ 6.7	5.5	0.5	0.5	1,898	265	220	5.2	0.7	0.6	— 14.3	0.01	5,255	0.01
New Mexico	3,508	3,192	3,732	+ 16.9	113.2	103.0	120.4	39,569	36,860	40,971	108.4	101.0	112.3	+ 11.2	2.21	539,505	1.54
New York	468	404	408	+ 1.0	15.1	13.0	13.2	5,185	4,863	4,787	14.2	13.3	13.1	— 1.5	0.26	163,847	0.47
Ohio	324	247	273	+ 10.5	10.4	8.0	8.8	3,510	2,908	3,120	9.6	8.0	8.5	+ 7.6	0.17	610,545	1.74
Oklahoma	13,310	11,006	12,722	+ 15.6	429.4	355.0	410.4	154,702	134,497	141,325	423.8	368.5	387.2	+ 5.1	7.63	5,790,759	16.51
Pennsylvania	1,527	1,075	987	— 8.2	49.3	34.7	31.8	16,750	12,996	12,563	45.9	35.6	34.4	— 3.4	0.68	1,089,136	3.10
Tennessee	1	1	1	.....	.....	.....	.....	12	10	8	.....	.....	.....	.....	.....	r468	.....
*Texas	47,436	62,687	72,807	+ 16.1	1,530.2	2,022.2	2,348.6	505,572	760,505	817,987	1,385.1	2,083.6	2,241.1	+ 7.6	44.14	11,242,720	32.05
Dist. 1: South Central	605	604	770	+ 27.5	19.5	19.5	24.9	7,217	7,075	8,120	19.8	19.4	22.2	+ 14.4	0.44	266,458	0.76
Dist. 2: Middle Gulf	2,455	4,292	5,079	+ 18.3	79.2	138.5	163.8	24,393	51,641	57,293	66.8	141.5	157.0	+ 8.1	3.10	452,706	1.29
Dist. 3: Upper Gulf	8,413	13,283	15,128	+ 13.9	271.4	428.5	488.0	89,811	167,198	174,832	246.1	458.1	479.0	+ 4.6	9.44	2,307,227	6.57
Dist. 4: Lower Gulf-S.W.	4,591	6,600	7,998	+ 21.2	148.1	212.9	258.0	49,543	79,662	88,102	135.7	218.3	241.4	+ 10.6	4.76	768,576	2.19
Dist. 5: East Central	606	1,054	1,310	+ 24.3	19.5	34.0	42.3	6,984	14,297	14,275	19.1	39.2	39.1	— 0.3	0.77	482,079	1.37
Dist. 6: Northeast	13,812	12,927	12,822	— 0.8	445.6	417.0	413.6	151,931	157,797	157,637	416.2	432.3	431.9	— 0.1	8.51	2,816,929	8.03
Dist. 7-B: North Central	858	1,053	1,305	+ 23.9	27.7	33.9	42.1	9,647	11,983	14,180	26.4	32.8	38.8	+ 18.3	0.77	436,732	1.24
Dist. 7-C: West Central	597	892	1,284	+ 43.9	19.3	28.8	41.4	6,465	10,070	13,704	17.7	27.6	37.5	+ 35.8	0.74	212,141	0.60
Dist. 8: West	8,628	15,318	20,111	+ 31.3	278.3	494.1	648.7	85,990	180,470	205,956	235.6	494.4	564.3	+ 14.1	11.12	1,912,598	5.45
Dist. 9: North	3,678	3,792	4,235	+ 11.7	118.6	122.3	136.6	39,426	45,274	47,956	108.0	124.0	131.4	+ 6.0	2.59	997,557	2.84
Dist. 10: Panhandle	2,690	2,523	2,765	+ 9.6	86.8	81.4	89.2	27,801	30,431	31,305	76.2	83.4	85.8	+ 2.9	1.69	601,003	1.71
Utah	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	11	.....
Virginia	.....	8	1	— 87.5	.....	0.2	.....	.....	16	65	.....	0.1	0.2	.....	.....	91	.....
West Virginia	302	226	212	— 6.2	9.7	7.3	6.9	3,433	2,929	2,599	9.4	8.0	7.1	— 11.3	0.14	432,603	1.23
Wyoming	2,558	3,301	4,123	+ 24.9	82.5	106.5	133.0	29,878	38,304	43,980	81.9	104.9	120.5	+ 14.9	2.38	749,780	2.14
Undistributed	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	572	.....
Total United States	128,434	146,471	163,496	+ 11.6	4,143.0	4,724.9	5,274.1	1,402,228	1,733,424	1,853,166	3,841.7	4,749.1	5,077.2	+ 6.9	100.0	35,079,053	100.00

* Data on Louisiana and Texas by districts are from various sources and so do not agree exactly with state totals, which are on Bureau of Mines Basis.

United States Crude Oil Production, By States, By Years (Part 1)

Data in thousands of barrels; from *Mineral Resources and Minerals Yearbook*, except where otherwise indicated in footnotes.

Year	Alabama	Arkansas	California	Colorado	Florida	Illinois	Indiana	Kansas	Kentucky	Louisiana	Michigan	Mississippi	Missouri	Montana	Nebraska	New Mexico
1859	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1860	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1861	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1862	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1863	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1864	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1865	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1866	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1867	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1868	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1869	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1870	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1871	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1872	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1873	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1874	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1875	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1876	.....	.....	12	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1877	.....	.....	13	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1878	.....	.....	15	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1879	.....	.....	20	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1880	.....	.....	40	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1881	.....	.....	100	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1882	.....	.....	129	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1883	.....	.....	143	.....	.....	.....	.....	.....	G5	.....	.....	.....	.....	.....	.....	.....
1884	.....	.....	262	.....	.....	.....	.....	.....	G4	.....	.....	.....	.....	.....	.....	.....
1885	.....	.....	325	.....	.....	.....	.....	.....	G5	.....	.....	.....	.....	.....	.....	.....
1886	.....	.....	377	.....	.....	.....	.....	.....	G5	.....	.....	.....	.....	.....	.....	.....
1887	.....	.....	678	76	.....	.....	.....	.....	G5	.....	.....	.....	.....	.....	.....	.....
1888	.....	.....	690	298	.....	.....	.....	.....	G5	.....	.....	.....	.....	.....	.....	.....
1889	.....	.....	303	317	.....	1	33	1	G5	.....	.....	.....	H	.....	.....	.....
1890	.....	.....	307	369	.....	1	64	1	G6	.....	.....	.....	H	.....	.....	.....
1891	.....	.....	324	666	.....	1	137	1	G9	.....	.....	.....	H	.....	.....	.....
1892	.....	.....	385	824	.....	1	698	5	G7	.....	.....	.....	H	.....	.....	.....
1893	.....	.....	470	594	.....	1	2,335	18	G3	.....	.....	.....	H	.....	.....	.....
1894	.....	.....	706	516	.....	H	3,689	40	G2	.....	.....	.....	H	.....	.....	.....
1895	.....	.....	1,209	438	.....	H	4,386	44	G2	.....	.....	.....	H	.....	.....	.....
1896	.....	.....	1,253	361	.....	H	4,681	114	G2	.....	.....	.....	H	.....	.....	.....
1897	.....	.....	1,903	385	.....	1	4,122	81	G H	.....	.....	.....	H	.....	.....	.....
1898	.....	.....	2,257	444	.....	H	3,731	72	G6	.....	.....	.....	H	.....	.....	.....
1899	.....	.....	2,642	390	.....	H	3,848	70	G18	.....	.....	.....	H	.....	.....	.....
1900	.....	.....	4,325	317	.....	H	4,874	75	G62	.....	J	.....	J2	.....	.....	.....
1901	.....	.....	8,787	461	.....	H	5,757	179	G137	.....	J	.....	J2	.....	.....	.....
1902	.....	.....	13,984	397	.....	H	7,481	332	G185	549	J	.....	J1	.....	.....	.....
1903	.....	.....	24,382	484	.....	.....	9,186	932	G554	918	J	.....	J3	.....	.....	.....
1904	.....	.....	29,649	501	.....	.....	11,339	4,251	G998	2,959	J	.....	J3	.....	.....	.....
1905	.....	.....	33,428	376	.....	181	10,964	I3,750	G1,217	8,910	J	.....	J3	.....	.....	.....
1906	.....	.....	33,099	328	.....	4,397	7,674	I3,627	G1,214	9,077	J	.....	J3	.....	.....	.....
1907	.....	.....	39,748	332	.....	24,282	5,128	2,410	G821	5,000	J	.....	J4	.....	.....	.....
1908	.....	.....	44,855	380	.....	33,686	3,283	1,801	728	5,789	J	.....	J15	.....	.....	.....
1909	.....	.....	55,472	311	.....	30,898	2,296	1,264	639	3,060	J	.....	J6	.....	.....	.....
1910	.....	.....	73,011	240	.....	33,143	2,160	1,128	469	6,841	J	.....	J4	.....	.....	.....
1911	.....	.....	81,134	227	.....	31,317	1,695	1,279	472	10,721	J	.....	J8	.....	.....	.....
1912	.....	.....	87,269	206	.....	28,602	970	1,593	484	9,263	K	.....	.....	.....	.....	.....
1913	.....	.....	97,788	189	.....	23,894	956	2,375	525	12,499	K	.....	K	.....	.....	K
1914	.....	.....	99,775	223	.....	21,920	1,336	3,104	503	14,309	K	.....	K	.....	.....	.....
1915	.....	.....	86,592	208	.....	19,042	876	2,823	437	18,192	K	.....	K	.....	.....	.....
1916	.....	.....	90,952	197	.....	17,714	769	8,738	L1,202	15,248	K	.....	K	45	.....	.....
1917	.....	.....	93,878	121	.....	15,777	760	36,536	L3,088	11,392	K	.....	.....	100	.....	.....
1918	.....	.....	97,532	143	.....	13,366	878	45,451	L4,368	16,043	K	.....	.....	69	.....	.....
1919	.....	.....	101,183	121	.....	11,960	972	33,048	9,278	17,188	K	.....	K	90	.....	K
1920	.....	K	103,377	111	.....	10,774	945	39,005	8,738	35,714	.....	.....	K	340	.....	K
1921	.....	10,473	112,600	108	.....	10,043	1,158	36,456	9,013	27,103	.....	.....	K	1,509	.....	K
1922	.....	12,712	138,468	97	.....	9,383	1,087	31,766	8,973	35,376	.....	.....	K	2,449	.....	K
1923	.....	36,610	262,876	86	.....	8,707	1,043	28,250	8,069	24,919	.....	.....	K	2,782	.....	K
1924	.....	46,028	228,933	445	.....	8,081	935	28,836	7,407	21,124	.....	.....	.....	2,815	.....	98
1925	.....	77,398	232,492	1,226	.....	7,863	829	38,357	6,759	20,272	4	.....	.....	4,091	.....	1,060
1926	.....	58,332	224,673	2,768	.....	7,760	808	41,498	6,274	23,201	94	.....	.....	7,727	.....	1,666
1927	.....	40,005	231,196	2,831	.....	6,994	852	41,069	6,719	22,818	439	.....	.....	5,058	.....	1,226
1928	.....	32,096	231,811	2,774	.....	6,462	1,052	38,596	7,359	21,847	594	.....	.....	4,015	.....	943
1929	.....	24,917	292,534	2,358	.....	6,319	981	42,813	7,775	20,554	4,528	.....	.....	3,980	.....	1,830
1930	.....	19,702	227,329	1,656	.....	5,736	994	41,638	7,389	23,272	3,911	.....	.....	3,349	.....	10,189
1931	.....	14,791	188,830	1,545	.....	5,039	840	37,018	6,456	21,804	3,789	.....	.....	2,830	.....	15,227
1932	.....	12,051	178,128	1,136	.....	4,673	806	34,848	6,287	21,807	6,910	.....	K	2,457	.....	12,455
1933	.....	11,686	172,010	919	.....	4,244	737	41,976	4,608	25,168	7,942	K	K	2,273	.....	14,116
1934	.....	11,182	174,305	1,139	.....	4,479	838	46,482	4,860	32,869	10,603	K	K	3,603	.....	16,864
1935	.....	11,008	207,832	1,560	.....	4,322	777	54,843	5,258	50,330	15,776	K	K	4,603	.....	20,483
1936	.....	10,469	214,773	1,650	.....	4,475	822	58,317	5,633	80,491	11,928	.....	K	5,868	.....	27,223
1937	.....	11,764	238,521	1,605	.....	7,499	844	70,761	5,484	90,924	16,628	.....	K	5,805	.....	38,854
1938	.....	18,180	249,749	1,412	.....	24,075	995	60,064	5,821	95,208	18,745	.....	K	4,946	.....	35,759
1939	.....	21,238	224,354	1,404	.....	94,912	1,711	60,703	5,621	93,646	23,462	107	40	5,960	2	37,637
1940	.....	25,775	223,881	1,626	.....	147,647	4,978	66,139	5,188	103,584	19,753	4,400	44	6,728	276	39,129
1941	.....	26,327	230,263	2,150	.....	132,393	7,411	83,242	4,762	115,908	16,359	15,327	47	7,526	1,898	39,569
1942	.....	26,628	248,326	2,199	.....	106,391	6,743	97,636	4,534	115,785	21,754	28,833	36	8,074	1,237	31,544
1943	.....	27,600	284,188	2,320	4	82,260	5,283	106,178	7,883	123,592	20,768	18,807	36	7,916	635	38,896
1944	43	29,418	311,793	3,083	12	77,413	5,118	98,762	9,621	129,645	18,490	16,337	45	8,647	417	39,555
1945	181	28,613	326,482	5,036	30	75,094	4,868	96,415	10,325	131,051	17,267	19,062	45	8,420	305	37,351
1946	380	28,375	315,179	12,016	57	75,297	6,726	97,218	10,578	143,303	17,074	24,216	51	8,801	265	36,860
1947P	398	29,609	332,958	15,766	260	66,440	6,092	105,072	9,469	159,276	16,283	35,163	55	8,700	220	40,971
Total	1,002	702,987	7,619,267	82,466	363	1,314,960	173,351	1,779,101	224,333	1,978,549	273,101	162,252	453	141,576	5,255	539,505

A Utah production estimated at 3,650 barrels in 1939; 3,126 barrels in 1940; and 189,726 barrels cumulative through 1940.

B *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer, shows for Alaska the following data: 1904-1919, estimated, 56,000 barrels; 1920, 11,000 barrels; 1921, 10,000 barrels; 1922-1928, estimated, 73,000 barrels; total, 1904-1928, 150,000 barrels.

C "Unclassified" includes 1912, Alaska and Michigan; 1913, Alaska, Michigan, Missouri and New Mexico; 1914-16, Alaska, Michigan and Missouri; 1917-18, Alaska and Michigan; 1919, Alaska, Michigan, Missouri and New Mexico; 1920. Alaska, Arkansas, Missouri, New Mexico and Utah; 1921-23, Alaska, Missouri and New Mexico; 1924-31, Alaska and Utah; 1932, Alaska, Missouri and Utah; 1933, Alaska, Mississippi, Missouri and Utah; 1934, Mississippi, Missouri and Utah; 1935, Mississippi, Missouri, Tennessee and Utah; 1936-40, Missouri, Tennessee and Utah; 1943, Virginia, 2; 1946, Virginia, 3.

D Pennsylvania and New York separated in years 1864-1881, by aid of *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer.

E *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer, gives the following additional estimates which are not shown by the official *Mineral Resources*; Ohio, 1860-1875, 200,000 barrels; West Virginia, 1860-1875, 2,800,000 barrels; Kentucky, 1860-1882, 161,000 barrels.

United States Crude Oil Production, By States, By Years (Part 2)

Data in thousands of barrels; from *Mineral Resources and Minerals Yearbook*, except where otherwise indicated in footnotes.

Year	New York	Ohio	Oklahoma	Pennsylvania	Tennessee	Texas	[A] Utah	Virginia	West Virginia	Wyoming	[B] Alaska	[C] Unclassified	Total United States	Total Value At Wells (Thousands of Dollars)	[O] Average Value per Bbl.
1859	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	2	$ 32	$20.00
1860	.....	E	.....	500	.....	.....	.....	.....	E	.....	.....	.....	500	4,800	9.60
1861	.....	E	.....	2,114	.....	.....	.....	.....	E	.....	.....	.....	2,114	1,036	.52
1862	.....	E	.....	3,057	.....	.....	.....	.....	E	.....	.....	.....	3,057	3,210	1.05
1863	.....	E	.....	2,611	.....	.....	.....	.....	E	.....	.....	.....	2,611	8,226	3.15
1864	D F H	E	.....	D F 2,116	.....	.....	.....	.....	E	.....	.....	.....	2,116	20,897	8.15
1865	D100	E	.....	D2,398	.....	.....	.....	.....	E	.....	.....	.....	2,498	16,460	6.59
1866	D144	E	.....	D3,454	.....	.....	.....	.....	E	.....	.....	.....	3,598	13,455	3.75
1867	D134	E	.....	D3,213	.....	.....	.....	.....	E	.....	.....	.....	3,347	8,067	2.40
1868	D146	E	.....	D3,500	.....	.....	.....	.....	E	.....	.....	.....	3,646	13,217	3.62
1869	D169	E	.....	D4,046	.....	.....	.....	.....	E	.....	.....	.....	4,215	23,730	5.60
1870	D211	E	.....	D5,050	.....	.....	.....	.....	E	.....	.....	.....	5,261	20,504	3.90
1871	D208	E	.....	D4,997	.....	.....	.....	.....	E	.....	.....	.....	5,205	22,591	4.40
1872	D252	E	.....	D6,041	.....	.....	.....	.....	E	.....	.....	.....	6,293	21,440	3.75
1873	D396	E	.....	D9,498	.....	.....	.....	.....	E	.....	.....	.....	9,894	18,100	1.80
1874	D437	E	.....	D10,490	.....	.....	.....	.....	E	.....	.....	.....	10,927	12,648	1.15
1875	D352	E	.....	D8,436	.....	.....	.....	.....	E	.....	.....	.....	8,788	7,368	.97
1876	D359	32	.....	D8,610	G	.....	.....	.....	120	.....	.....	.....	9,133	22,983	2.52
1877	D525	30	.....	D12,610	G	.....	.....	.....	172	.....	.....	.....	13,350	31,789	2.38
1878	D607	38	.....	D14,557	G	.....	.....	.....	180	.....	.....	.....	15,397	18,045	1.17
1879	D787	29	.....	D18,898	G	.....	.....	.....	180	.....	.....	.....	19,914	17,211	.86
1880	D1,041	39	.....	D24,987	G	.....	.....	.....	179	.....	.....	.....	26,286	24,601	.94
1881	D1,095	34	.....	D26,281	G	.....	.....	.....	151	.....	.....	.....	27,661	25,448	.92
1882	6,685	40	.....	23,368	G	.....	.....	.....	128	.....	.....	.....	30,350	23,631	.78
1883	4,004	47	.....	19,125	G	.....	.....	.....	126	.....	.....	.....	23,450	25,790	1.10
1884	3,231	90	.....	20,541	G	.....	.....	.....	90	.....	.....	.....	24,218	20,596	.85
1885	2,658	662	.....	18,118	G	.....	.....	.....	91	.....	.....	.....	21,859	19,198	.88
1886	2,151	1,783	.....	23,647	G	.....	.....	.....	102	.....	.....	.....	28,065	19,996	.71
1887	2,075	5,023	.....	20,281	G	.....	.....	.....	145	.....	.....	.....	28,283	18,877	.67
1888	1,789	10,011	.....	14,700	G	.....	.....	.....	119	.....	.....	.....	27,612	17,948	.65
1889	1,897	12,472	.....	19,591	G	H	.....	.....	544	.....	.....	.....	35,164	26,963	.77
1890	1,658	16,125	.....	26,800	G	.....	.....	.....	493	.....	.....	.....	45,824	35,365	.77
1891	1,585	17,740	H	31,424	G	H	.....	.....	2,406	.....	.....	.....	54,293	30,527	.56
1892	1,273	16,363	H	27,149	G	H	.....	.....	3,810	.....	.....	.....	50,515	25,907	.51
1893	1,032	16,249	H	19,283	G	H	.....	.....	8,446	.....	.....	.....	48,431	28,950	.60
1894	942	16,792	H	18,078	G	H	.....	.....	8,577	2	.....	.....	49,344	35,522	.72
1895	913	19,545	H	18,231	G	H	.....	.....	8,120	4	.....	.....	52,892	57,632	1.09
1896	1,205	23,941	H	19,379	G	1	.....	.....	10,020	3	.....	.....	60,960	58,519	.96
1897	1,279	21,561	1	17,983	G	66	.....	.....	13,090	4	.....	.....	60,476	40,874	.68
1898	1,205	18,739	.....	14,743	G	546	.....	.....	13,615	6	.....	.....	55,364	44,193	.80
1899	1,321	21,142	.....	13,054	G	669	.....	.....	13,911	6	.....	.....	57,071	64,604	1.13
1900	1,301	22,363	6	13,258	G	836	.....	.....	16,196	6	.....	.....	63,621	75,989	1.19
1901	1,207	21,648	10	12,625	G	4,394	.....	.....	14,177	5	.....	.....	69,389	66,417	.96
1902	1,120	21,014	37	12,064	G	18,084	.....	.....	13,513	6	.....	.....	88,767	71,179	.80
1903	1,163	20,480	139	11,355	G	17,956	.....	.....	12,900	9	.....	.....	100,461	94,694	.94
1904	1,113	18,877	1,367	11,126	G	22,241	.....	.....	12,645	12	N	.....	117,081	101,175	.86
1905	1,118	16,347	I8,264	10,437	G	28,136	.....	.....	11,578	8	.....	.....	134,717	84,157	.62
1906	1,243	14,788	I18,091	10,257	G	12,568	.....	.....	10,121	7	.....	.....	126,494	92,445	.73
1907	1,212	12,207	43,524	10,000	G	12,323	M	.....	9,095	M9	N	.....	166,095	120,107	.72
1908	1,160	10,859	45,799	9,424	.....	11,207	M	.....	9,523	M18	.....	.....	178,527	129,079	.72
1909	1,135	10,633	47,859	9,299	.....	9,534	M	.....	10,745	M20	.....	.....	183,171	128,329	.70
1910	1,054	9,916	52,029	8,795	.....	8,899	M	.....	11,753	M115	.....	.....	209,557	127,900	.61
1911	953	8,817	56,069	8,248	.....	9,526	M	.....	9,796	M187	N	.....	220,449	134,045	.61
1912	874	8,969	51,427	7,838	.....	11,735	M	.....	12,129	M1,572	K	4	222,935	164,213	.74
1913	948	8,781	63.579	7,917	.....	15,010	N	.....	11,567	2,407	K	11	248,446	237,121	.95
1914	939	8,536	73,632	8,170	.....	20,068	N	.....	9,680	3,560	K	8	265,763	214,125	.81
1915	888	7,825	97,915	7,838	.....	24,943	N	.....	9,265	4,246	K	14	281,104	179,463	.64
1916	874	7,744	107,072	7,593	L1	27,645	N	.....	8,731	6,234	K	8	300,767	330,900	1.10
1917	880	7,751	107,508	7,733	L12	32,413	N	.....	8,379	8,978	K	10	335,316	522,635	1.56
1918	809	7,285	103,347	7,408	L8	38,750	N	.....	7,867	12,596	K	8	355,928	703,944	1.98
1919	851	7,736	86,911	8,137	15	79,366	N	.....	8,327	13,172	K	12	378,367	760,266	2.01
1920	906	7,400	106,206	7,438	14	96,868	K	.....	8,249	16,831	K	13	442,929	1,360,745	3.07
1921	988	7,335	114,634	7,418	12	106,166	.....	.....	7,822	19,333	K	12	472,183	814,745	1.73
1922	1,000	6,781	149,571	7,425	10	118,684	.....	.....	7,021	26,715	K	13	557,531	895,111	1.61
1923	1,250	7,085	160 929	7,609	8	131,023	.....	.....	6,358	44,785	K	18	732,407	978,430	1.34
1924	1,440	6,811	173,538	7,486	10	134,522	K	.....	5,920	39,498	K	13	713,940	1,022,683	1.43
1925	1,695	7,212	176,768	8,097	24	144,648	K	.....	5,763	29,173	K	12	763,743	1,284,960	1.68
1926	1,956	7,272	179,195	8,961	43	166,916	K	.....	5,946	25,776	K	8	770,874	1,447,760	1.88
1927	2,242	7,593	277,775	9,526	60	217,389	K	.....	6,023	21,307	K	7	901,129	1,172,830	1.30
1928	2,603	7,015	249,857	9,956	46	257,320	K	.....	5,661	21,461	K	6	901,474	1,054,880	1.17
1929	3,377	6,743	255,004	11,820	19	296,876	K	.....	5,574	19,314	K	7	1,007,323	1,280,417	1.27
1930	3,647	6,486	216,486	12,803	21	290,457	K	.....	5,071	17,868	K	7	898,011	1,070,200	1.19
1931	3,363	5,327	180,574	11,892	6	332,437	K	.....	4,472	14,834	K	7	851,081	550,630	.65
1932	3,508	4,644	153,244	12,412	5	312,478	K	.....	3,876	13,418	K	16	785,159	680,460	.87
1933	3,181	4,235	182,251	12,624	5	402,609	K	.....	3,815	11,227	K	30	905,656	608,000	.67
1934	3,804	4,234	180,107	14,478	10	381,516	K	.....	4,095	12,556	.....	41	908,065	904,825	1.00
1935	4,236	4,082	185,288	15,810	K	392,666	K	.....	3,902	13,755	.....	65	996,596	961,440	.96
1936	4,663	3,847	206,555	17,070	K	427,411	K	.....	3,847	14,582	.....	63	1,099,687	1,199,820	1.09
1937	5,478	3,559	228,839	19,189	K	510,318	K	.....	3,845	19,166	.....	77	1,279,160	1,513,340	1.18
1938	5,045	3,298	174,994	17,426	K	475,850	K	.....	3,684	19,022	.....	82	1,214,355	1,373,060	1.13
1939	5,098	3,156	159,913	17,382	50	483,528	4	.....	3,580	21,454	.....	.....	1,264,962	1,294,470	1.02
1940	4,999	3,159	156,164	17,353	24	493,209	3	.....	3,444	25,711	.....	.....	1,353,214	1,385,440	1.02
1941	5,185	3,510	154,702	16,750	12	505,572	4	.....	3,433	29,878	.....	.....	1,402,228	1,602,000	1.14
1942	5,421	3,543	140,690	17,779	9	483,097	.....	.....	3,574	32,812	.....	.....	1,386,645	1,643,470	1.19
1943	5,059	3,322	123,152	15,757	10	594,343	.....	2	3,349	34,253	.....	.....	1,505,613	1,809,020	1.20
1944	4,697	2,937	124,616	14,118	8	746,699	.....	4	3,070	33,356	.....	.....	1,677,904	2,032,960	1.21
1945	4,648	2,828	139,299	12,515	8	754,710	.....	4	2,879	36,219	.....	.....	1,713,655	2,094,250	1.22
1946	4,863	2,908	134,497	12,996	10	760,505	.....	16	2,929	38,304	.....	.....	1,733,424	2,461,462	1.42
1947[P]	4,787	3,120	141,325	12,563	8	817,987	.....	65	2.599	43,980	.....	.....	1,853,166	3,609,533	1.95
Total	163,847	610,545	5,790,759	1,089,136	468	11,242,720	11	91	432,603	749,780	.....	572	35,079,053	43,396,074	1.24

[F] New York included with Pennsylvania.

[G] Tennessee included with Kentucky, 1876-1907, inclusive.

[H] Less than 500 barrels.

[I] Figures for Oklahoma and Kansas for years 1905-1906 shown together by *Mineral Resources*; here divided by aid of *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer.

[J] Michigan shown with Missouri in 1900-1911.

[K] Included under "Unclassified."

[L] Kentucky and Tennessee figures in years 1916-18 obtained with aid of *Mineral Resources* and *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer.

[M] Insignificant production of Utah (mostly used as fuel) shown with Wyoming.

[N] Little production but no record available.

[O] Figures on average price per barrel for years 1859-1875 taken from *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer; remainder from *Mineral Resources* and *Minerals Yearbook* except 1946, and 1947 estimated.

[P] Bureau of Mines figures for first 10 months; November and December estimated by THE OIL WEEKLY, with aid of weekly reports of American Petroleum Institute and other sources.

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Natural Gas Production

To Exceed 1947's Record 4.4 Trillion Feet

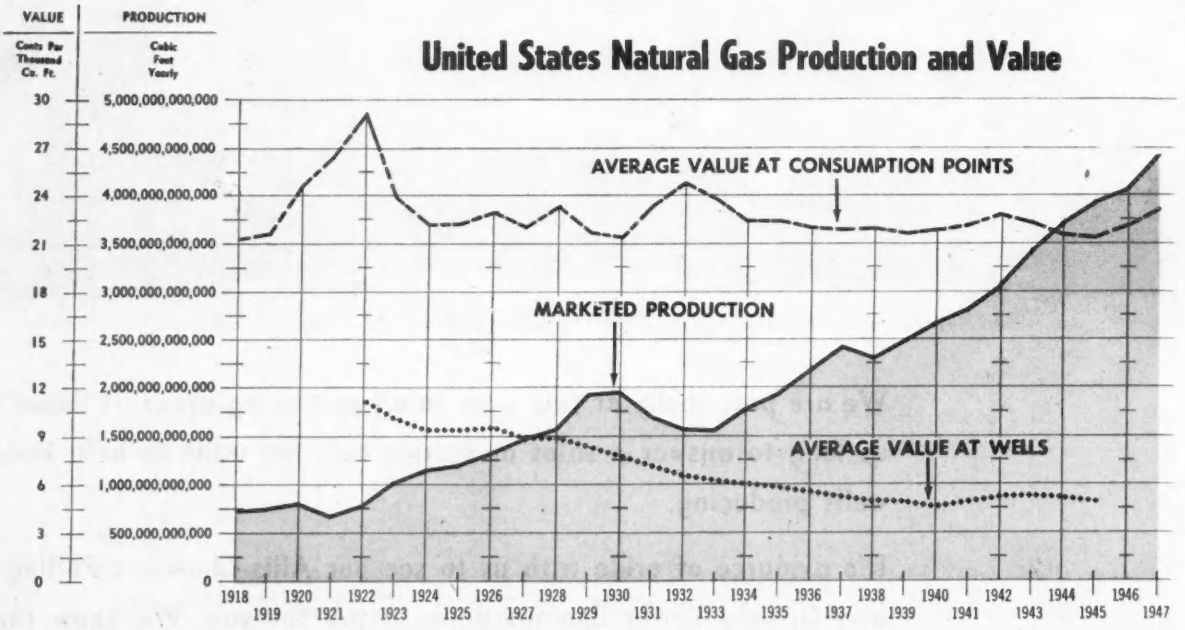
THE natural gas industry continued its phenomenal expansion during 1947 and developments assure that additional significant gains are to be recorded in 1948.

Preliminary figures indicate marketed production of natural gas (gross production less quantities returned to producing formations and losses) reached a new high of 4.4 trillion cubic feet in the U. S., an average of more than 12 billion cubic feet per day. This was 360 billion cubic feet more per year than the amount marketed in the preceding 12 months, and constituted a gain of 1 billion cubic feet daily, or nearly 9 percent. The volume marketed in 1947 was twice that of 1936, and nearly 50 percent more than in 1941.

Sharp Growth Indicated

Further sharp growth in marketed natural gas production is certain, as the nation is in the midst of an enormous natural gas pipe line expansion program. It is presaged that the increase during 1948 will be even larger than the unusually big gain recorded in 1947, with 1949 and 1950 likely to see even greater advances.

Construction and operation of new facilities during the year enlarged the capacity of the nation's pipe line system by nearly 2 billion cubic feet per day, much of which was not placed in operation until late 1947 and consequently will have a greater influence in 1948 than in the past year. Such construction added 5370 miles of pipe line, bringing the country's network up to 229,000 miles, or



YEAR	*No. of Producing Wells	Marketed Production (Millions of Cubic Feet)	Average Value (Cents per Thousand Cubic Feet) At Wells	Average Value (Cents per Thousand Cubic Feet) At Points of Consumption
1918...	†40,369	721,001	‡	21.3
1919...	†41,500	745,916	‡	21.6
1920...	†42,700	798,210	‡	24.6
1921...	†43,900	662,052	‡	26.4
1922...	†45,100	762,546	11.1	29.1
1923...	†46,300	1,006,976	10.0	23.8
1924...	†47,500	1,141,521	9.3	22.2
1925...	†48,700	1,188,571	9.4	22.3
1926...	†49,900	1,313,019	9.5	22.9
1927...	†51,100	1,445,428	8.8	22.0
1928...	†52,300	1,568,139	8.9	23.2
1929...	53,545	1,917,693	8.2	21.6
1930...	55,020	1,943,421	7.6	21.4
1931...	55,756	1,686,436	7.0	23.3
1932...	54,160	1,555,990	6.4	24.7
1933...	53,660	1,555,474	6.2	23.7
1934...	54,130	1,770,721	6.0	22.3
1935...	53,700	1,916,595	5.8	22.4
1936...	53,960	2,167,802	5.5	22.0
1937...	55,050	3,407,620	5.1	21.9
1938...	53,770	2,295,562	4.9	21.8
1939...	53,530	2,476,756	4.9	21.6
1940...	53,880	2,660,222	4.5	21.7
1941...	55,500	2,812,658	4.9	22.1
1942...	56,150	3,053,475	5.1	22.7
1943...	57,200	3,414,689	5.2	22.3
1944...	‡	3,711,039	5.1	21.5
1945...	‡	3,918,686	4.9	21.4
1946...	‡	†4,040,000	‡	†22.0
1947...	‡	†4,400,000	‡	†23.1

Source: U. S. Bureau of Mines. *Only dry natural gas producing wells included. †Estimated. ‡Not available.

the same mileage as trunk line railroad tracks in the nation.

Headline news in the new pipe line category was the completion of a 1200-mile "Biggest Inch" artery from Texas to California, and the final conversion of the war emergency 1254-mile "Big Inch" and 1497-mile "Little Big Inch" lines from carriers of crude oil and refined products to natural gas transporting systems. The effects of these three systems on marketed gas production will be reflected chiefly in 1948. The Texas-California line did not begin operating until last December, and the two war emergency lines moved gas only about half of 1947. All three systems are to further step up their capacities substantially during the next few months.

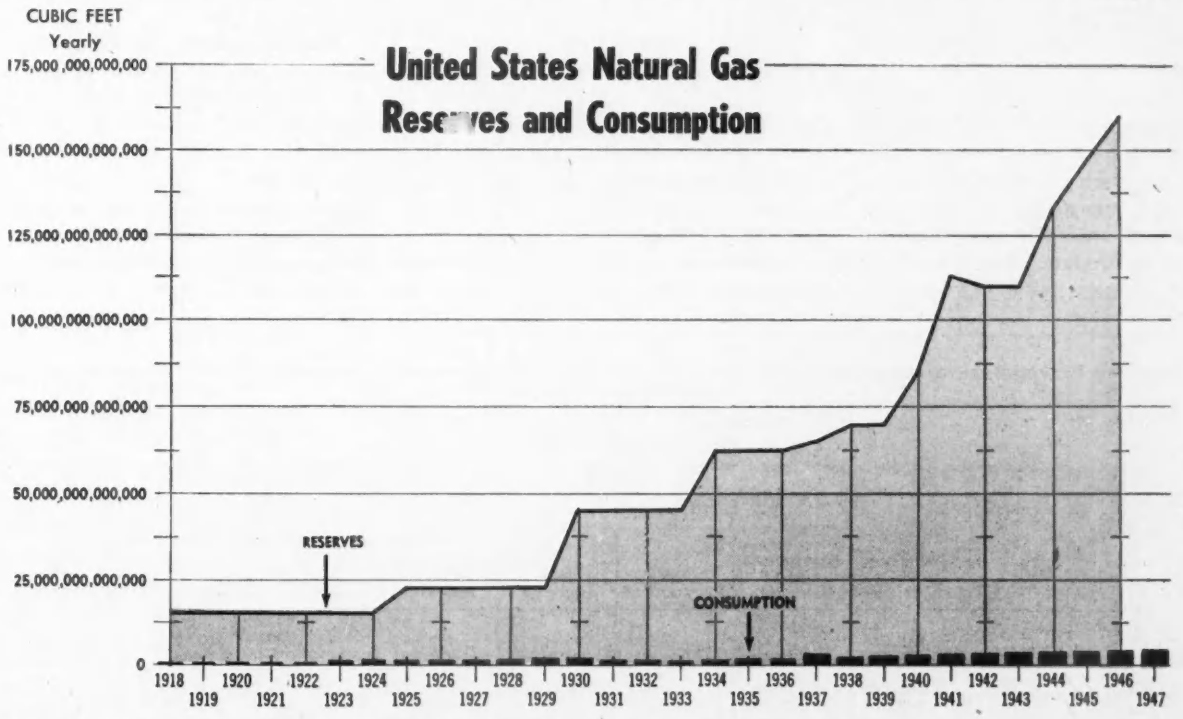
More than twice as much gas pipe line construction was authorized by the Federal Power Commission in 1947 than in any previous year. Only a few of these newly approved carriers were put into operation during the year, and these, of course, were the smaller ones. Largest project approved by FPC was the construction of a new 1500-mile Texas to Detroit line. Construction on many of

Production of Natural Gas in Principal Producing States During 1947

MILLIONS OF CUBIC FEET

STATE	GROSS PRODUCTION				Returned to Formation	Losses and Waste	Marketed Production
	Oil Well Gas	Sour Gas	Dry Natural Gas	Total			
Arkansas	59,262	41,658	4,656	105,576	11,111	3,625	90,840
California	513,776	.....	180,387	694,163	125,000	13,324	555,839
Colorado	2,786	.....	5,883	8,669	.....	.....	8,669
Kansas	.....	.....	164,797	164,797	.....	.....	164,797
Louisiana	151,146	.....	558,549	709,695	161,459	17,033	531,203
Michigan	3,594	.....	19,498	23,092	.....	606	22,486
Mississippi	34,381	.....	425	34,806	1,830	.....	32,976
Montana	.....	.....	31,448	31,448	.....	.....	31,448
New Mexico	121,105	.....	33,254	154,359	1,796	25,800	126,763
Oklahoma	174,763	.....	293,374	468,137	.....	.....	468,137
Texas	719,188	281,343	1,948,436	2,948,967	767,004	378,057	1,803,906
West Virginia	.....	.....	222,100	222,100	.....	.....	222,100
Total	1,780,001	323,001	3,462,807	5,565,809	1,068,200	438,445	4,059,164

Source: Interstate Oil Compact Commission for 10 months and last two months estimated.



YEAR	Reserves at End of Year (Billions of Cubic Feet)	Authority for Estimate of Reserves	Consumption During Year (Marketed Production: Billions of Cubic Feet)	Years' Supply in Reserve
1918	15,000	E. Holley Poe et al in report	721	20.8
1919	15,000	September 23, 1947	746	20.1
1920	15,000	" " "	798	18.8
1921	15,000	" " "	662	22.7
1922	15,000	" " "	763	19.7
1923	15,000	" " "	1,007	14.9
1924	15,000	" " "	1,142	13.1
1925	23,000	*Gas Facts, 1945 and 1946*	1,189	19.3
1926	23,000	" "	1,313	17.5
1927	23,000	" "	1,445	15.9
1928	23,000	" "	1,568	14.7
1929	23,000	" "	1,918	12.0
1930	46,000	Earl P. Hindes, then Cities Service	1,943	23.7
1931	46,000	Co.	1,686	27.3
1932	46,000	" " "	1,556	29.6
1933	46,000	" " "	1,555	29.6
1934	62,000	Ralph E. Davis, Consulting En-	1,771	35.0
1935	62,000	gineer	1,917	32.3
1936	62,000	" " "	2,168	28.6
1937	66,000	" " "	3,408	19.4
1938	70,000	Lyon F. Terry, Chase Nat'l. Bank	2,296	30.5
1939	70,000	" " "	2,477	28.3
1940	85,000	Ralph E. Davis, Consulting Engineer	2,660	32.0
1941	113,800	Petroleum Administration for War	2,813	40.5
1942	110,000	" " "	3,053	36.0
1943	110,000	" " "	3,415	32.2
1944	133,500	" " "	3,711	36.0
1945	147,789	American Gas Association	3,919	37.7
1946	160,576	" "	4,040	39.7
1947	no data		4,400	....

Estimated Proved Recoverable Reserves of Natural Gas Liquids in the United States as of January 1, 1947, Compared with Production in 1946

From Annual Survey by American Gas Association in Collaboration with American Petroleum Institute

(THOUSANDS OF BARRELS)

STATE	Non-Associated	Associate	Dissolved	Total Reserves	1946 Production
Arkansas	41,071	8,306	12,223	**617,600**	3,457
California	40,328	107,300	160,644	**308,272**	21,885
Colorado	775	410	1,192	**2,377**	200
Illinois	.....	.....	34,200*‡	**34,200‡**	3,900
Indiana	.....	.....	85*	**85**	16
Kansas	80,202	1,140	1,150	**82,492**	1,991
Kentucky	16,071*	.....	.....	**16,071**	1,310
Louisiana	330,466	75,019	13,911	**419,396**	13,500
Michigan	.....	.....	655*	**655**	309
Mississippi	17,212	34,095	192,594	**243,901**	108
Montana	8,534	.....	.....	**8,534**	108
New Mexico	27,697	30,950	14,962	**73,609**	2,818
Ohio	1,714*	.....	.....	**1,714**	143
Oklahoma	45,597	10,020	12,700	**68,317**	9,875
Pennsylvania	2,309*	.....	.....	**2,309**	262
Texas	1,292,177	296,072	397,357	**1,985,606**	66,134
West Virginia	19,285*	.....	.....	**19,285**	2,400
Wyoming	458	9,400	15,600	**25,458**	846
Miscellaneous‡	.....	.....	6*	**6**	.....
Total	1,923,896†	572,712†	857,279†‡	**3,353,887‡**	129,262

* Not allocable by types, but occurring principally in the column shown.
† Approximate total; see footnote *.
‡ Includes Alabama, Florida, New York and Utah.
‡ Figures revised March 11, 1947.

the authorized projects is being delayed by the shortage of pipe. When completed, several years from now, the service of new pipe lines already planned will benefit nearly 80 cities and many smaller communities in 20 states. In all, the current natural gas pipe line expansion program has been estimated by FPC to cost in the neighborhood of $1.2 billion. It is expected to provide capacity for the moving of an additional 1.3 trillion cubic feet of gas annually.

Natural gas reserves of the U. S. appear adequate to meet the tremendous new demand for many years to come. Latest available figures, by the reserves committee of the American Gas Association, placed the proved recoverable reserves of natural gas in the U. S. at the end of 1946 at 160.6 trillion cubic feet, equivalent to 39.7 years of supply. This represented an increase of 12.8 trillion cubic feet or an increase over the previous year of 2½ times the amount withdrawn.

Year by year, despite rapid gains in production, estimates of natural gas reserves have increased until the 1946 estimate represented an advance of 600 percent above 1925, 160 percent above 1934, and 90 percent more than 1940.

Of the estimated 160.6 trillion cubic feet of proved natural gas reserves, 86.3 trillion cubic feet, or better than half, are located in Texas. Thus, this state occupies a position in the natural gas picture similar to that which it holds in crude oil production and reserves. Louisiana with slightly more than 22.4 trillion cubic feet is the second ranking natural gas reserve state.

Natural gas also received increased attention the past year as a raw material for the production of high octane gasoline and other chemical products. During 1947 two large commercial plants, the first in the U. S., were projected to produce gasoline from natural gas by the Fischer-Tropsch method, one of which will use 64 million and the other 100 million cubic feet of natural gas per day.

Estimated Proved Recoverable Reserves of Natural Gas in the United States as of January 1, 1947, Compared with One Year Previously

From Annual Survey by American Gas Association

MILLIONS OF CUBIC FEET

STATE	Reserves as of Dec. 31, 1945	CHANGES IN RESERVES DURING 1946: Discoveries Extensions and Revisions	CHANGES IN RESERVES DURING 1946: Net Production	CHANGES IN RESERVES DURING 1946: Net Increase	RESERVES AS OF DECEMBER 31, 1946: Total Reserves	RESERVES AS OF DECEMBER 31, 1946: Non-Associated	RESERVES AS OF DECEMBER 31, 1946: Associated	RESERVES AS OF DECEMBER 31, 1946: Dissolved
Alabama	**23**	75	1	74	**97**	.....	.....	97
Arkansas	**869,686**	54,171	52,195	1,976	**871,662**	447,651	162,276	261,735
California	**10,855,707**	803,056	532,462	270,594	**11,126,301**	3,687,430	3,198,714	4,240,157
Colorado	**396,282**	(—) 70,905	9,614	(—) 80,519	**315,763**	155,440	41,075	119,248
Illinois	**268,000**	33,500	33,500	.....	**268,000**	3,000	55,000	210,000
Indiana	**17,000**	3,200	3,200	.....	**17,000**	4,000	8,000	5,000
Kansas	**13,250,605**	636,771	206,532	430,239	**13,680,844**	13,257,617	212,310	210,917
Kentucky	**1,436,800**	44,200	95,000	(—) 50,800	**1,386,000**	1,299,000	.....	87,000
Louisiana	**19,849,393**	3,170,050	607,932	2,562,118	**22,411,511**	18,323,314	2,697,126	1,391,071
Michigan	**8,931**	148,069	26,000	122,069	**131,000**	76,200	.....	54,800
Mississippi	**2,007,859**	383,842	21,188	362,654	**2,370,513**	1,731,821	446,098	192,594
Montana	**1,202,521**	(—)319,521	29,599	(—)349,120	**853,401**	853,401	.....	.....
Nebraska	**375**	(—) 374	.....	(—) 374	**1**	.....	.....	1
New Mexico	**5,190,309**	899,737	185,260	714,477	**5,904,786**	3,079,900	2,132,911	691,975
New York	**76,000**	900	7,000	(—) 6,100	**69,900**	69,000	.....	900
Ohio	**626,800**	46,200	59,000	(—) 12,800	**614,000**	573,000	.....	41,000
Oklahoma	**10,079,938**	1,311,816	655,908	655,908	**10,735,845**	7,572,279	1,589,538	1,574,028
Pennsylvania	**520,000**	61,000	78,000	(—) 17,000	**503,000**	453,000	.....	50,000
Texas	**78,306,676**	10,154,021	2,097,238	8,056,783	**86,363,459**	62,345,192	15,282,025	8,736,242
West Virginia	**1,928,300**	116,700	205,000	(—) 88,300	**1,840,000**	1,739,000	.....	101,000
Wyoming	**816,763**	252,379	33,545	218,834	**1,035,597**	693,191	235,176	107,230
Miscellaneous*	**81,399**	265	4,443	(—) 4,178	**77,221**	76,900	.....	321
Total	**147,789,367**	17,729,152	4,942,617	12,786,535	**160,575,901**	116,440,336	26,060,249	18,075,316

* Includes Florida, Missouri and Utah.

Notes: Volumes are reported at a pressure base of 14.65 pounds per square inch absolute, and at a standard temperature of 60° F.
Net production equals estimated gross withdrawals, less gas reinjected into underground reservoirs.
Reserves of **dissolved** gas were estimated jointly with the API Committee on Petroleum Reserves.

United States Marketed Production of Natural Gas, By States, By Years

(Millions of Cubic Feet)

Sources: U. S. Bureau of Mines, except for some figures for early years which are from "Petroleum in the United States and Possessions" by Ralph Arnold and William J. Kemnitzer, and except where otherwise indicated by footnotes.

YEAR	Arkansas	California	Colorado	Illinois	Indiana	Kansas	Kentucky	Louisiana	Michigan	Mississippi	Montana	New Mexico	New York
•Pre–1906..	281	9,810	631	1,505	471,800	81,865	13,243	31	.....	.....	.....	.....	31,340
1906..	21	153	23	410	7,861	69,323	789	39	.....	.....	.....	.....	2,548
1907..	•570	230	57	1,155	6,624	76,707	1,303	88	.....	.....	.....	.....	3,288
1908..	•1,208	479	50	4,979	5,256	80,740	1,430	252	.....	.....	.....	.....	3,843
1909..	•1,778	2,324	•45	8,473	6,159	75,074	2,097	1,365	1	.....	.....	.....	4,696
1910..	•2,412	2,764	•40	6,723	5,760	59,380	1,357	4,110	1	.....	.....	.....	6,010
1911..	•1,994	6,390	•35	6,762	4,365	38,800	1,275	9,786	2	.....	.....	.....	5,240
1912..	•1,465	9,355	•30	5,603	3,618	28,068	1,951	14,493	2	.....	.....	.....	8,626
1913..	•806	11,035	•27	4,767	2,921	22,884	1,821	26,653	2	.....	.....	.....	8,515
1914..	•633	17,829	•24	3,548	2,580	22,628	1,422	26,775	2	.....	.....	.....	8,935
1915..	992	21,891	•21	2,690	2,261	27,046	1,667	25,540	2	.....	6	.....	7,977
1916..	2,388	31,643	•18	3,534	1,715	31,710	2,107	32,081	1	.....	213	.....	8,036
1917..	5,610	49,427	•14	4,439	1,712	24,439	2,802	31,287	1	.....	334	.....	8,372
1918..	5,295	39,719	10	4,473	1,667	27,825	3,022	36,094	1	.....	177	.....	8,461
1919..	5,587	55,607	10	3,825	1,407	16,150	2,057	47,062	1	.....	858	.....	8,124
1920..	9,027	66,041	8	3,013	1,779	21,158	3,345	58,274	.....	.....	818	.....	8,419
1921..	4,260	75,942	4	2,646	1,066	15,717	4,820	58,004	.....	.....	336	.....	6,583
1922..	9,700	84,580	4	3,383	947	20,289	5,872	70,267	1	.....	486	.....	6,947
1923..	24,215	131,434	1	4,049	880	30,913	11,953	112,031	1	.....	1,470	.....	6,497
1924..	36,616	189,692	48	4,072	998	25,580	12,875	160,945	1	.....	1,071	.....	6,196
1925..	41,878	187,789	574	4,165	1,168	26,917	10,770	152,620	.....	.....	1,496	.....	6,210
1926..	43,566	204,915	554	3,808	901	38,095	10,410	157,423	.....	.....	2,283	921	7,027
1927..	30,450	212,364	1,725	3,741	1,124	42,646	10,206	186,961	1	.....	4,253	1,019	5,908
1928..	20,235	246,215	2,931	3,051	1,290	45,644	15,383	227,821	469	.....	6,277	838	7,224
1929..	19,928	342,214	2,787	2,983	1,012	38,469	27,588	261,138	4,526	90	9,659	3,054	8,387
1930..	18,585	334,789	3,312	2,890	1,217	37,630	28,023	278,341	2,075	179	10,060	9,497	9,624
1931..	13,300	305,930	2,536	2,130	1,337	38,742	27,870	224,155	472	6,048	10,940	19,354	7,868
1932..	10,235	263,484	2,547	1,769	1,349	40,690	29,005	201,561	968	8,648	13,295	17,604	8,813
1933..	8,288	259,799	2,449	1,631	1,544	41,596	31,380	197,826	1,528	8,679	14,391	19,148	6,865
1934..	7,024	268,122	2,633	1,868	1,802	46,909	33,124	225,713	2,789	8,245	14,971	24,075	6,278
1935..	6,167	284,109	2,843	1,448	1,777	57,125	39,738	249,450	4,203	9,643	19,870	27,931	8,288
1936..	8,500	320,406	3,687	865	2,241	69,178	43,903	290,151	7,167	11,821	23,003	33,928	12,431
1937..	9,690	329,769	3,186	1,040	1,551	83,890	55,719	315,301	9,080	13,348	24,765	46,337	21,325
1938..	11,301	315,168	1,904	1,169	1,299	75,203	46,163	283,899	10,165	13,656	21,216	50,706	39,402
1939..	10,107	348,361	2,015	2,746	791	80,556	47,771	294,370	10,726	14,527	23,178	60,284	29,222
1940..	14,379	351,950	2,533	8,359	1,137	90,003	53,056	343,191	12,648	6,365	26,231	63,990	12,187
1941..	19,148	374,905	3,256	10,053	1,522	111,121	69,067	403,855	13,916	4,268	28,499	64,655	10,456
1942..	19,456	403,968	4,865	14,484	1,599	112,921	80,089	447,686	15,521	2,082	31,475	78,164	8,718
1943..	36,469	457,757	6,445	18,120	1,450	133,729	92,364	505,294	18,006	1,461	31,562	86,500	8,062
1944..	46,453	502,017	5,141	18,137	1,014	157,733	94,223	534,688	19,653	1,352	32,102	87,727	7,052
1945..	46,600	502,442	4,914	16,663	1,543	145,959	81,714	542,789	21,874	4,587	31,829	105,023	9,210
1946..	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.
1947..	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.
Total...	556,617	7,622,818	63,937	201,169	560,044	2,311,052	1,004,774	7,039,410	155,806	114,999	387,133	800,755	399,210

YEAR	Ohio	Oklahoma	Pennsylvania	Texas	West Virginia	Wyoming	Others	Total United States	VALUE AT WELLS		VALUE AT POINTS OF CONSUMPTION	
									Total (Thousands of Dollars)	Average Per M Cubic Ft. (Cts.)	Total (Thousands of Dollars)	Average Per M Cubic Ft. (Cts.)
•Pre–1906..	305,593	2,215	1,611,066	815	387,799	506	43,281	**2,961,781**	.....	....	426,448	14.4
1906..	45,436	3,520	138,161	•1,000	119,400	•100	59	**388,843**	.....	....	46,874	12.1
1907..	52,041	4,867	135,516	•1,200	122,687	•140	149	**406,622**	.....	....	54,222	13.3
1908..	47,442	11,925	130,476	•1,500	112,181	•180	200	**402,141**	.....	....	54,640	13.6
1909..	53,223	28,037	127,697	•3,000	166,435	•220	82	**480,706**	.....	....	63,207	13.1
1910..	48,232	50,430	126,867	•4,000	190,706	•253	109	**509,155**	.....	....	70,756	13.9
1911..	49,450	67,276	108,869	5,503	206,891	•265	90	**512,993**	.....	....	74,622	14.5
1912..	56,210	73,799	112,150	7,470	239,007	•247	109	**562,203**	.....	....	84,564	15.0
1913..	50,612	75,018	118,860	12,160	245,454	•273	90	**581,898**	.....	....	87,847	15.1
1914..	68,270	78,167	110,745	13,434	236,489	•306	80	**591,867**	.....	....	94,116	15.9
1915..	79,510	87,517	113,692	13,324	244,004	•321	118	**628,579**	.....	....	101,312	16.1
1916..	69,888	123,517	130,484	15,810	299,319	•557	149	**753,170**	.....	....	120,227	16.0
1917..	68,917	137,384	133,397	17,047	308,617	•1,209	102	**795,110**	.....	....	142,089	17.9
1918..	61,261	124,317	123,813	13,440	265,161	4,339	1,926	**721,001**	.....	....	153,554	21.3
1919..	63,153	163,649	113,489	24,710	234,095	6,014	118	**745,916**	.....	....	160,888	21.6
1920..	58,938	154,467	125,787	37,063	239,719	10,312	42	**798,210**	.....	....	196,194	24.6
1921..	47,412	124,058	86,144	44,504	174,921	15,608	27	**662,052**	.....	....	174,617	26.4
1922..	51,481	140,631	101,276	47,945	195,288	23,427	22	**762,546**	84,873	11.1	221,535	29.1
1923..	53,812	203,082	112,562	74,535	203,867	35,523	151	**1,006,976**	100,849	10.0	240,001	23.8
1924..	47,396	214,452	105,863	107,247	182,285	46,036	148	**1,141,521**	105,779	9.3	253,856	22.2
1925..	43,235	249,285	101,632	134,872	180,345	45,539	76	**1,188,571**	112,047	9.4	265,271	22.3
1926..	47,363	286,421	107,089	175,392	180,223	46,567	61	**1,313,019**	124,693	9.5	300,168	22.9
1927..	51,381	326,864	105,709	254,063	162,375	43,582	1,056	**1,445,428**	127,468	8.8	317,930	22.0
1928..	56,341	320,861	99,466	301,990	163,018	47,490	1,595	**1,568,139**	139,898	8.9	363,726	23.2
1929..	57,936	357,893	101,951	464,928	167,333	44,648	1,169	**1,917,693**	157,596	8.2	413,276	21.6
1930..	63,394	348,116	88,706	517,880	144,180	43,219	1,704	**1,943,421**	147,048	7.6	416,090	21.4
1931..	56,326	263,685	74,797	464,580	124,797	39,770	1,790	**1,686,436**	117,505	7.0	392,816	23.3
1932..	51,466	255,487	61,611	456,832	100,540	28,938	1,148	**1,555,990**	98,985	6.4	384,632	24.7
1933..	47,929	245,759	63,579	475,691	100,653	25,830	909	**1,555,474**	97,096	6.2	368,540	23.7
1934..	50,330	254,457	86,238	602,976	109,161	23,148	858	**1,770,721**	106,438	6.0	395,378	22.3
1935..	49,592	274,313	94,464	642,366	115,772	26,643	853	**1,916,595**	110,402	5.8	429,374	22.4
1936..	46,994	280,481	110,362	734,561	138,076	29,322	725	**2,167,802**	119,193	5.5	476,813	22.0
1937..	42,783	296,260	115,928	854,561	149,084	31,023	2,980	**2,407,620**	123,457	5.1	528,354	21.9
1938..	35,257	263,164	76,547	882,473	134,342	26,678	5,850	**2,295,562**	113,571	4.9	500,698	21.8
1939..	36,469	250,875	93,882	979,427	159,226	26,614	5,609	**2,476,756**	120,243	4.9	534,240	21.6
1940..	40,639	257,626	90,725	1,063,538	188,751	27,346	5,568	**2,660,222**	120,493	4.5	577,939	21.7
1941..	41,858	234,054	92,819	1,086,312	207,681	29,284	5,929	**2,812,658**	138,508	4.9	621,338	22.1
1942..	45,055	269,704	93,532	1,170,345	215,193	33,124	5,494	**3,053,475**	154,236	5.1	692,737	22.7
1943..	52,001	285,045	93,543	1,323,885	223,787	34,351	4,858	**3,414,689**	176,893	5.2	760,950	22.3
1944..	51,724	310,888	92,987	1,525,515	181,452	34,521	6,660	**3,711,039**	189,263	5.1	797,873	21.5
1945..	49,967	357,530	82,188	1,711,401	160,225	35,282	6,946	**3,918,686**	192,016	4.9	838,599	21.4
1946..	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	▷**4,040,000**	n. a.	n. a.	▷888,800	▷22.0
1947..	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	▷**4,400,000**	n. a.	n. a.	▷1,015,000	▷23.1
Total..	2,396,317	7,857,096	5,794,669	16,269,295	7,680,539	868,755	108,891	**70,633,286**	n. a.	n. a.	15,102,106	21.4

• Indicates figures are estimates. ▷ Indicates figures are preliminary and subject to revision. n. a. means not available. Bureau has not yet released figures that break national totals for recent years into state figures.

Natural Gasoline Output

Going Up for 16th Year in Row

THE upward trend in U. S. production of natural gasoline and allied products was accelerated during 1947. This was the 15th consecutive year in which record quantities of those products were produced, and prospects are that another new peak will be established in 1948.

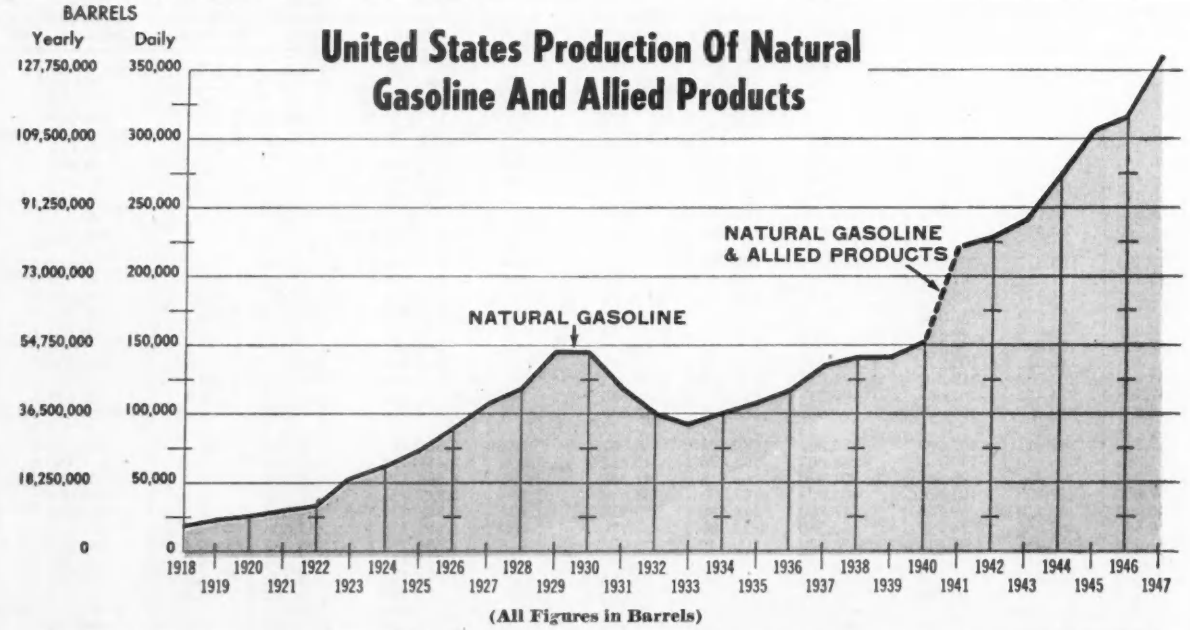
A total of 131,370,000 barrels of natural gasoline, cycle products and liquefied petroleum gases was produced the past year, an increase of 16,217,000 barrels, or 14 percent, over the 115,153,000 barrels manufactured in 1946. The growth of natural gasoline and allied products has been phenomenal in recent years, having risen nearly one-third since 1944.

Output in 1947 was equivalent to an average of 360,000 barrels daily, up 44,500 barrels from the 135,500 barrels of the preceding year. This was, by a substantial margin, the sharpest annual gain ever recorded in the production of these products.

At the end of the year production of natural gasoline and allied products already had increased to 375,000 barrels daily. With some additional plants due to be placed in operation during the year, it is indicated that output in 1948 can be expected to average about 385,000 barrels daily to reach an annual total of approximately 140 million barrels for the year.

Texas continued to lead all states in production, and also accounted for the largest portion of the increase achieved by the nation. This state produced an average of 171,000 barrels daily during the year, and contributed almost half of the entire yield of the country. This compared with 148,000 barrels produced daily in 1946, and therefore represented a gain of 23,000 barrels, or slightly over half of the nation's increase during the year. Much of the enlarged recovery expected in 1948 will occur in this state, which at the end of the year already has boosted its output to 180,000 barrels daily.

California had the second biggest increase of any state, and also retained its position as the second largest producing state of natural gasoline and allied products. This state produced 70,000 barrels daily in 1947.



(All Figures in Barrels)

YEAR	Annual Production	Daily Average	YEAR	Annual Production	Daily Average	YEAR	Annual Production	Daily Average	YEAR	Annual Production	Daily Average
1918	6,727,000	18,430	1926	32,455,000	88,917	1934	36,556,000	100,153	(*) Natural Gasoline and Allied Prod		
1919	8,370,000	22,931	1927	39,075,000	107,054	1935	39,333,000	107,761	1941	80,855,000	221,520
1920	9,161,000	25,098	1928	43,191,000	118,331	1936	42,770,000	117,178	1942	83,322,000	228,279
1921	10,713,000	29,350	1929	53,183,000	145,706	1937	49,177,000	134,731	1943	87,716,000	240,318
1922	12,044,000	32,997	1930	52,631,000	144,194	1938	51,347,000	140,676	1944	100,046,000	273,350
1923	19,434,000	53,243	1931	43,617,000	119,498	1939	51,650,000	141,507	1945	112,004,000	306,860
1924	22,235,000	60,197	1932	36,281,000	99,400	1940	55,700,000	152,502	1946	115,153,000	315,488
1925	26,845,000	73,547	1933	33,810,000	92,630				1947	131,370,000	359,918

* Bureau began a new series covering 1941 and subsequent year, which includes cycle condensate.

Production of Natural Gasoline and Allied Products, By States, By Years

(Natural Gasoline, Cycle Products, and Liquefied Petroleum Gases)

(THOUSANDS OF GALLONS)

YEAR	Arkansas	California	Colorado	Illinois	Indiana	Kansas	Kentucky	Louisiana	Michigan	Montana	New Mexico
Natural Gasoline:											
1911	.....	50	.....	*145	.....	.....	.....	.....	.....	.....	.....
1912	.....	1,041	.....	*290	.....	.....	.....	.....	.....	.....	.....
1913	.....	3,461	.....	*581	.....	*2	.....	.....	.....	.....	.....
1914	.....	7,581	.....	1,164	.....	*8	.....	.....	.....	.....	.....
1915	.....	12,835	.....	1,035	.....	*40	.....	210	.....	.....	.....
1916	.....	17,159	.....	2,260	.....	215	725	2,113	.....	.....	.....
1917	.....	28,818	.....	4,934	.....	1,175	3,818	4,980	.....	.....	.....
1918	.....	32,269	2	4,575	.....	2,390	3,331	7,021	.....	.....	.....
1919	.....	40,386	.....	6,060	.....	3,284	5,136	10,063	.....	.....	.....
1920	.....	48,208	.....	6,055	.....	4,331	4,497	10,610	.....	.....	.....
1921	.....	58,220	.....	7,536	.....	3,587	4,242	15,341	.....	.....	.....
1922	4,289	67,120	.....	7,700	.....	2,856	5,205	29,406	.....	.....	.....
1923	16,183	173,329	.....	7,356	.....	8,775	7,601	40,720	.....	.....	.....
1924	17,533	232,579	.....	9,091	.....	11,658	7,274	48,098	.....	.....	.....
1925	19,686	303,180	35	9,874	.....	19,592	7,685	43,489	.....	.....	.....
1926	30,385	389,366	276	9,987	.....	25,369	7,689	43,557	.....	.....	1,488
1927	37,498	498,020	912	8,853	.....	36,095	7,480	44,844	.....	.....	1,827
1928	32,677	584,111	1,909	7,817	.....	36,765	7,267	55,022	.....	.....	1,506
1929	33,455	840,325	1,630	7,080	2	36,227	6,006	64,957	.....	.....	1,077
1930	30,637	829,713	1,322	6,867	2	35,106	6,641	73,693	.....	.....	3,663
1931	26,282	680,399	659	5,024	1	32,690	5,464	58,034	.....	.....	17,775
1932	18,653	551,897	472	4,558	1	24,792	4,877	46,199	.....	.....	17,507
1933	15,215	496,293	408	3,673	.....	24,869	4,514	36,973	188	1,295	19,149
1934	13,033	506,272	643	3,810	.....	27,891	4,171	40,558	589	1,237	21,748
1935	13,076	534,624	417	2,642	.....	32,507	5,614	49,732	1,850	1,739	19,563
1936	11,957	593,416	451	2,337	.....	37,775	6,009	72,687	2,015	2,071	28,921
1937	11,285	623,894	404	2,567	.....	57,026	7,344	106,415	2,408	2,296	38,253
1938	25,648	660,890	386	2,436	.....	55,988	7,040	95,634	3,581	1,768	49,596
1939	24,634	607,237	390	4,012	.....	62,175	7,785	94,090	2,971	2,161	54,707
1940	32,096	587,476	380	21,499	.....	64,691	9,539	113,741	3,919	2,603	55,713
1941	28,108	577,127	390	54,872	.....	72,876	10,247	201,049	5,670	2,517	69,115
Cumulative	442,330	10,587,236	11,086	216,750	6	720,755	157,201	1,409,236	23,191	17,687	401,608
Natural Gasoline and Allied Products:											
1941	34,389	659,765	390	93,165	.....	85,691	35,371	225,724	5,670	3,966	81,000
1942	42,677	633,326	346	139,323	.....	81,828	36,682	296,074	2,518	4,517	89,164
1943	56,837	693,332	†	185,487	.....	85,206	43,317	306,062	1,226	4,664	81,005
1944	75,536	771,280	†	194,369	.....	69,834	48,742	492,659	8,500	4,768	81,161
1945	85,941	891,753	†	175,992	.....	72,637	46,879	549,234	13,630	4,726	97,800
1946	84,080	910,469	†	161,946	.....	85,296	54,291	567,400	12,224	4,615	103,086
1947, Total	**91,992**	**1,070,976**	†	**163,776**	.....	**98,298**	**58,670**	**624,514**	**4,412**	**5,284**	**116,100**
(Daily Average)	252	2,934	†	449	.....	269	161	1,711	12	14	318
1947, Thousand Barrels	2,190	25,499	†	3,899	.....	2,340	1,397	14,869	105	126	2,764
(Daily Average)	6	70	†	11	.....	6	4	41	.....	.....	8

YEAR	New York	Ohio	Oklahoma	Pennsylvania	Texas	West Virginia	Wyoming	Others	Total	VALUE AT PLANTS: Thousands of Dollars	VALUE AT PLANTS: Av. Per Gallon (Cents)
Natural Gasoline:											
1911	.....	1,679	388	1,467	.....	3,660	.....	37	7,426	$ 532	7.2
1912	.....	1,719	1,575	2,041	.....	5,318	.....	97	12,081	1,157	9.6
1913	.....	2,073	6,463	3,680	.....	7,662	.....	139	24,061	2,458	10.2
1914	.....	2,440	17,278	4,612	.....	9,278	.....	292	42,653	3,106	7.3
1915	.....	2,199	31,666	5,899	*130	10,854	.....	497	65,365	5,151	7.9
1916	249	2,639	48,360	9,715	1,293	18,765	.....	.....	103,493	14,331	13.8
1917	181	5,440	115,123	13,826	6,920	32,669	.....	.....	217,884	40,189	18.4
1918	218	6,745	163,701	15,775	7,326	37,604	1,579	.....	282,536	50,364	17.8
1919	458	8,801	189,995	20,284	93,387	52,150	5,581	.....	351,535	64,197	18.3
1920	411	10,016	178,857	21,151	32,956	58,941	8,711	.....	384,744	71,788	18.7
1921	366	9,100	185,341	19,856	77,141	54,646	14,558	.....	449,934	61,815	13.7
1922	506	8,600	189,404	18,518	95,405	56,796	19,967	.....	505,832	72,711	14.4
1923	408	10,035	270,249	19,132	177,765	63,381	21,292	.....	816,226	77,268	9.5
1924	477	9,443	301,062	19,254	186,571	61,549	29,272	.....	933,861	82,233	8.8
1925	414	8,701	390,861	18,850	214,092	58,201	32,777	33	1,127,470	120,383	10.7
1926	539	10,817	475,716	20,343	243,093	63,807	40,625	33	1,363,090	136,412	10.0
1927	449	12,167	548,109	16,744	320,723	64,192	43,212	19	1,641,144	118,688	7.2
1928	392	13,174	619,691	16,571	324,516	69,729	42,861	26	1,814,034	138,944	7.7
1929	264	11,166	676,030	18,411	419,485	72,944	44,544	35	2,233,688	158,410	7.1
1930	208	8,937	591,194	16,713	491,299	63,328	51,132	39	2,210,494	128,160	5.8
1931	132	5,199	454,886	14,339	426,695	52,844	51,523	32	1,831,918	63,732	3.5
1932	117	5,163	378,584	11,685	371,106	43,773	44,391	25	1,523,800	49,244	3.2
1933	96	4,662	360,488	11,686	366,515	39,848	34,103	25	1,420,000	54,368	3.8
1934	85	5,881	355,438	10,781	466,570	41,854	34,799	.....	1,535,360	60,523	3.9
1935	27	6,232	379,913	12,623	516,748	42,433	32,246	.....	1,651,986	70,940	4.3
1936	22	6,991	418,591	14,267	520,547	44,389	33,894	.....	1,796,340	84,572	4.7
1937	33	7,704	492,290	13,940	615,281	50,379	33,915	.....	2,065,434	97,125	4.7
1938	27	7,382	468,499	10,734	685,920	50,398	30,647	.....	2,156,574	87,266	4.0
1939	34	7,445	436,123	11,756	770,047	52,272	31,461	.....	2,169,300	90,050	4.2
1940	17	8,062	399,369	15,371	932,040	58,782	34,102	.....	2,339,400	68,261	2.9
1941	17	8,217	362,247	15,440	1,180,221	65,873	34,728	.....	2,688,714	105,815	3.9
Cumulative	6,147	218,829	9,507,491	425,464	9,459,742	1,408,369	751,920	1,329	35,766,377	$2,180,193	....
Natural Gasoline and Allied Products:											
1941	17	8,217	453,383	16,011	1,558,819	98,044	36,288	.....	3,395,910	.....	....
1942	15	6,975	445,115	15,294	1,567,830	101,828	36,012	.....	3,499,524	.....	....
1943	12	6,495	422,313	17,534	1,646,031	97,942	†36,609	.....	3,684,072	.....	....
1944	12	7,282	421,768	17,495	1,870,419	88,917	†49,190	.....	4,201,932	.....	....
1945	8	6,452	416,184	14,181	2,188,305	87,609	†52,842	.....	4,704,173	.....	....
1946	8	6,344	418,963	11,266	2,272,808	100,126	†43,490	.....	4,836,412	.....	....
1947, Total	9	6,798	444,423	12,463	2,625,112	142,656	†52,080	.....	5,517,563	.....	....
(Daily Average)	.....	19	1,218	34	7,192	391	143	.....	15,117	.....	....
1947, Thousand Barrels	.....	162	10,582	297	62,503	3,397	1,240	.....	131,370	.....	....
(Daily Average)	.....	.....	29	1	171	9	3	.....	360	.....	....

* Estimate. † Wyoming includes Colorado drip gasoline.

Liquefied Gas

Sales Soar to Meet Demand

SALES of liquefied petroleum gas in the U. S. have more than doubled in the last three years, but the market is far from satisfied and thus presages that additional significant gains will be scored in the future.

The volume of liquefied petroleum gas sold in the U. S. last year reached an estimated total of 1,845,000,000 gallons, an increase of 30.3 percent over the preceding year. The quantity sold was limited by several factors, such as insufficient production of appliances and utilization equipment, shortage in transportation facilities, and inability to obtain necessary materials to construct additional facilities for production of these fuels.

During 1947, domestic use of liquefied petroleum gas increased over 1946 by 31.8 percent, exceeding 1 billion gallons. This was greater than the industry's total sales for all uses in 1944. It is estimated that at the close of 1947 there were approximately 4½ million homes using liquefied petroleum gases for household purposes. This means that approximately one-fifth of the homes using gas, whether natural, manufactured or LPG, were being served by liquefied gas.

In spite of the fact that demand for liquefied petroleum gas appliances was not met, startling increases were made in appliance sales to LPG users in 1947. It is estimated that approximately four times as many liquefied gas automatic water heaters were sold in 1947 as in 1946. Indications point to twice the sales of household liquefied gas refrigerations as in 1946. It is estimated that one-fourth of all the gas ranges manufactured were installed for LPG customers. More than 15 percent of the floor furnaces installed in 1947 were for liquefied gas.

Industrial use of liquefied gas increased 11.6 percent over 1946. The use of LPG by utilities is estimated to have increased 55.8 percent in 1947 over the previous year's consumption. The greater portion of this gain was attributable to the use of liquefied gas to offset a shortage in supply of either manufactured or natural gas.

Marketed Production of Liquefied Petroleum Gas

Source: Paper by R. W. Thomas and K. W. Rugh of Phillips Petroleum Company, released January, 1948.

YEAR	TOTAL SALES		DISTRIBUTION—(Thousands of Gallons)							
	Gallons (in Thousands)	Percent Increase	*Domestic	Percent Increase	†Industrial and Miscellaneous	Percent Increase	Gas Manufacture	Percent Increase	Chemical Manufacture	Percent Increase
1922	223	.....								
1923	227	24.4								
1924	376	36.0	Sale of liquefied petroleum gas confined primarily to bottled gas business prior to 1928							
1925	404	7.2								
1926	465	15.2								
1927	1,091	134.6								
1928	4,523	314.6	2,600	.....	400	.....	1,500	.....	.....	.....
1929	9,931	119.6	5,900	126.9	1,500	275.0	2,500	66.7	.....	.....
1930	18,017	81.4	11,800	100.0	2,200	46.7	4,000	60.0	.....	.....
1931	28,770	59.7	15,295	29.6	7,172	226.0	6,303	57.6	.....	.....
1932	34,115	18.6	16,244	6.2	8,167	13.9	9,703	53.9	.....	.....
1933	38,931	14.1	16,626	2.3	13,987	71.3	8,318	—14.3	.....	.....
1934	56,427	44.9	17,681	6.3	32,448	132.0	6,298	—24.3	.....	.....
1935	76,855	36.2	21,380	20.9	47,894	47.6	7,581	20.4	.....	.....
1936	106,652	38.8	30,014	40.4	67,267	40.4	9,371	23.6	.....	.....
1937	141,400	32.6	40,823	36.0	62,610	‡	11,175	19.3	26,792	.....
1938	165,201	16.8	57,832	41.7	62,694	0.0	12,386	10.8	32,299	20.5
1939	223,580	35.3	87,530	51.4	93,723	49.4	15,435	24.6	26,892	—16.7
1940	313,456	40.2	134,018	53.1	124,482	34.5	20,285	31.4	34,671	29.0
1941	462,852	47.7	220,722	64.7	172,669	38.6	25,255	24.5	44,206	27.5
1942	585,440	26.5	303,857	37.3	197,149	14.3	31,366	24.2	53,038	20.0
1943	675,233	15.3	344,962	13.7	237,396	20.2	37,519	19.6	55,356	4.4
1944	898,071	33.0	445,617	29.0	254,590	7.3	45,879	22.3	151,985	175.0
1945	1,067,979	19.0	533,252	19.7	256,577	0.8	53,849	17.4	224,291	47.5
1946	1,415,840	32.6	766,150	43.7	255,375	—0.5	86,660	61.0	307,655	37.1
1947	1,845,000	30.3	1,010,000	31.8	285,000	11.6	135,000	55.8	415,000	34.9

* Household use plus other requirement by these customers such as irrigation pumping, tractor fuel, flame weeding, chicken brooding and similar uses. Included also is LF-Gas sold by domestic distributors but used for industrial purposes, internal combustion engine fuel and for gas manufacturing purposes.

† Includes LP-Gas sold for fueling internal combustion engines.

‡ Not comparable due to segregation of chemical manufacturing.

REMARKS: In this table total sales for all years except 1947 were obtained from U. S. Bureau of Mines reports. Distribution for the years 1931 to 1946, inclusive, was obtained from the same source. All other volumes were estimated by R. W. Thomas and K. W. Rugh of Phillips Petroleum Company in paper released in January, 1948. The total sale volume includes all LP-Gas (propane, butane, and propane-butane mixtures) when sold as such. Until 1944 the sale of pentane when sold for any purpose other than motor fuel blending was included. Since then it has been excluded. It does not include butane when blended with heavier petroleum fractions for motor fuel purposes. Intercompany sales transactions such as purchases of LP-Gases by one company from other companies and resold as LP-Gases have been eliminated in order to avoid duplication of sales figures. The data do not reflect sales of LP-Gases used directly by the producer at the point of production for fuel, polymerization, solvent de-waxing, etc. Neither do the figures include sales of hydrocarbons to plants manufacturing synthetic rubber or aviation gasoline or their components.

Billion Barrels Added to Nation's

DESPITE the highest production rate ever recorded, the proved unproduced petroleum reserves of the U. S. increased by a substantial amount during 1947. This resulted from the nation enjoying a very successful petroleum finding year, in which it proved through discovery and development operations the existence of the largest annual amount of new oil since 1938, and the fourth largest volume of any year in history.

Consequently, at the end of 1947 proved petroleum reserves in the U. S. are estimated to have reached an all-time high of 23,066,576,000 barrels of crude oil and condensate. This compares with 21,924,354,000 barrels of these reserves estimated by the API to have existed one year ago.

Such a big quantity of new oil was found that the addition to reserves also was the greatest since 1938, and the fourth greatest annual gain in history. The net increase in crude oil and condensate reserves during the year totaled 1,142,222,000 barrels, which resulted from the proving up of an estimated 2,995,388,000 barrels of new crude oil and condensate while the country was producing 1,853,166,000 barrels.

The finding of nearly 3 billion barrels of new oil was only slightly larger than the 2,830,965,000 barrels found during 1946, but was far more than the average of 1,880,331,000 barrels discovered annually during the war years of 1942-1945. The amount found last year also exceeded by approximately 1 billion barrels the volumes of new oil proved up during 1940 and 1941. The largest quantity of new petroleum ever found in any single year was the 3,723,028,000 discovered in 1937. In only two other years, 1929 and 1938, have more than 3 billion barrels of new petroleum been proved up.

This estimate of new reserves proved during the year took into consideration the recoverable oil indicated so far in new fields and new zones discovered during the year, and also the new petroleum proved up during the year through

Estimated Proved Petroleum Reserves in the United States

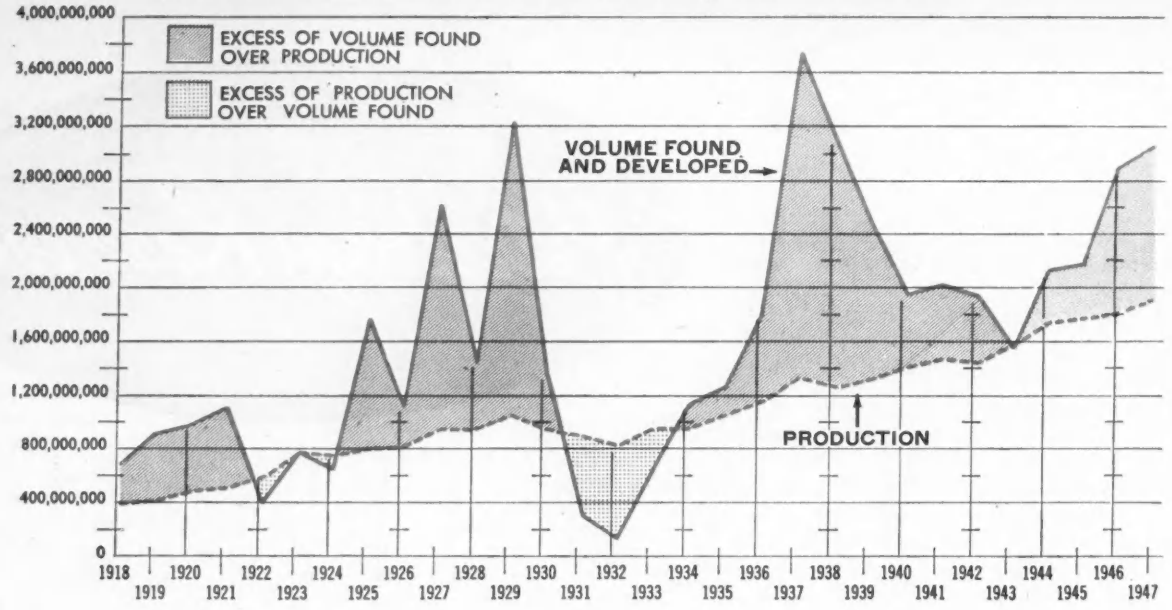
Changes in 1947 estimated by WORLD OIL: reserves at beginning of year from American Petroleum Institute; production in 1947 includes Bureau of Mines data for 10 months and A.P.I. estimates for November and December.

(In Barrels)

STATE OR DISTRICT	*Proved Reserves January 1, 1947	‡New Reserves Proved in 1947	Production in 1947	Proved Reserves January 1, 1948	Net Change in Reserves 1947
Alabama	512,000	450,000	398,000	**564,000**	+ 52,000
Arkansas	267,058,000	9,560,000	29,609,000	**247,009,000**	— 20,049,000
California	3,293,491,000	348,750,000	332,958,000	**3,309,283,000**	+ 15,792,000
Colorado	299,870,000	48,375,000	15,766,000	**332,479,000**	+ 32,609,000
Florida	†287,000	338,000	260,000	**365,000**	+ 78,000
Illinois	351,264,000	59,876,000	66,440,000	**344,700,000**	— 6,564,000
Indiana	44,070,000	5,824,000	6,092,000	**43,802,000**	— 268,000
Kansas	545,316,000	115,875,000	105,072,000	**556,119,000**	+ 10,803,000
Kentucky	59,188,000	11,725,000	9,469,000	**61,444,000**	+ 2,256,000
Louisiana	1,651,797,000	258,760,000	159,276,000	**1,751,281,000**	+ 99,484,000
Michigan	69,177,000	26,240,000	16,283,000	**79,134,000**	+ 9,957,000
Mississippi	270,221,000	72,260,000	35,163,000	**307,318,000**	+ 37,097,000
Missouri	†75,000	65,000	55,000	**85,000**	+ 10,000
Montana	104,246,000	7,500,000	8,700,000	**103,046,000**	— 1,200,000
Nebraska	875,000	100,000	220,000	**755,000**	— 120,000
New Mexico	543,453,000	66,460,000	40,971,000	**568,942,000**	+ 25,489,000
New York	76,289,000	4,850,000	4,787,000	**76,352,000**	+ 33,000
Ohio	29,220,000	3,500,000	3,120,000	**29,600,000**	+ 380,000
Oklahoma	898,186,000	159,285,000	141,325,000	**916,146,000**	+ 17,960,000
Pennsylvania	97,501,000	12,000,000	12,563,000	**96,938,000**	— 563,000
Tennessee	†16,000	10,000	8,000	**18,000**	+ 2,000
Texas	11,646,360,000	1,442,840,000	817,987,000	**12,271,213,000**	+ 624,853,000
Virginia	†75,000	25,000	65,000	**35,000**	— 40,000
West Virginia	35,655,000	2,400,000	2,599,000	**35,456,000**	— 199,000
Wyoming	589,358,000	40,840,000	43,980,000	**586,218,000**	— 3,140,000
Total United States	20,873,560,000	2,697,908,000	1,853,166,000	**21,718,302,000**	+ 844,742,000

* From American Petroleum Institute except as noted.
† Extimated by WORLD OIL.
‡ In both new and older reservoirs and reflecting upward or downward revisions of earlier estimates, based on more information.

United States Petroleum Discovery And Production



All Figures in Barrels

YEAR	Estimated Proved Reserves Beginning of Year	*New Reserves Proved During Year	Crude Oil Production During Year	Estimated Proved Reserves at End of Year	Ratio of Reserves At End of Year to Year's Production	Net Increase or Decrease in Reserves During Year
Reserves Including Condensate						
1918	5,900,000,000	655,928,000	355,928,000	6,200,000,000	17.4 : 1	+ 300,000,000
1919	6,200,000,000	878,367,000	378,367,000	6,700,000,000	17.7 : 1	+ 500,000,000
1920	6,700,000,000	942,929,000	442,929,000	7,200,000,000	16.3 : 1	+ 500,000,000
1921	7,200,000,000	1,072,183,000	472,183,000	7,800,000,000	16.5 : 1	+ 600,000,000
1922	7,800,000,000	357,531,000	557,531,000	7,600,000,000	13.6 : 1	— 200,000,000
1923	7,600,000,000	732,407,000	732,407,000	7,600,000,000	10.4 : 1	. . . . .
1924	7,600,000,000	613,940,000	713,940,000	7,500,000,000	10.5 : 1	— 100,000,000
1925	7,500,000,000	1,763,743,000	763,743,000	8,500,000,000	11.1 : 1	+1,000,000,000
1926	8,500,000,000	1,070,874,000	770,874,000	8,800,000,000	11.4 : 1	+ 300,000,000
1927	8,800,000,000	2,601,129,000	901,129,000	10,500,000,000	11.7 : 1	+1,700,000,000
1928	10,500,000,000	1,401,474,000	901,474,000	11,000,000,000	12.2 : 1	+ 500,000,000
1929	11,000,000,000	3,207,323,000	1,007,323,000	13,200,000,000	13.1 : 1	+2,200,000,000
1930	13,200,000,000	1,298,011,000	898,011,000	13,600,000,000	15.1 : 1	+ 400,000,000
1931	13,600,000,000	251,081,000	851,081,000	13,000,000,000	15.3 : 1	— 600,000,000
1932	13,000,000,000	85,159,000	785,159,000	12,300,000,000	15.7 : 1	— 700,000,000
1933	12,300,000,000	605,656,000	905,656,000	12,000,000,000	13.3 : 1	— 300,000,000
1934	12,000,000,000	1,085,065,000	908,065,000	12,177,000,000	13.4 : 1	+ 177,000,000
1935	12,177,000,000	1,219,596,000	996,596,000	12,400,000,000	12.4 : 1	+ 223,000,000
1936	12,400,000,000	1,763,087,000	1,099,687,000	13,063,400,000	11.9 : 1	+ 663,400,000
1937	13,063,400,000	3,723,028,000	1,279,160,000	15,507,268,000	12.1 : 1	+2,443,868,000
1938	15,507,268,000	3,055,233,000	1,214,355,000	17,348,146,000	14.3 : 1	+1,840,878,000
1939	17,348,146,000	2,399,828,000	1,264,962,000	18,483,012,000	14.6 : 1	+1,134,866,000
1940	18,483,012,000	1,894,717,000	1,353,214,000	19,024,515,000	14.1 : 1	+ 541,503,000
1941	19,024,515,000	1,967,009,000	1,402,228,000	19,589,296,000	14.0 : 1	+ 564,781,000
1942	19,589,296,000	1,880,142,000	1,386,645,000	20,082,793,000	14.5 : 1	+ 493,497,000
1943	20,082,793,000	1,486,972,000	1,505,613,000	20,064,152,000	13.3 : 1	— 18,641,000
1944	20,064,152,000	2,066,983,000	1,677,904,000	20,453,231,000	12.2 : 1	+ 389,079,000
1945	20,453,231,000	2,087,237,000	1,713,655,000	20,826,813,000	12.2 : 1	+ 373,582,000
1946	20,826,813,000	2,830,965,000	1,733,424,000	21,924,354,000	12.6 : 1	+1,097,541,000
1947	21,924,354,000	2,995,388,000	1,853,166,000	23,066,576,000	12.4 : 1	+1,142,222,000
Reserves of Crude Oil Only						
1945	19,784,530,000	1,870,971,000	1,713,655,000	19,941,846,000	11.6 : 1	+ 157,316,000
1946	19,941,846,000	2,665,138,000	1,733,424,000	20,873,560,000	12.0 : 1	+ 931,714,000
1947	20,873,560,000	2,697,908,000	1,853,166,000	21,718,302,000	11.7 : 1	+ 844,742,000

* In both new and older reservoirs and reflecting upward or downward revisions of earlier estimates based on additional information.
Source: Reserves from American Petroleum Institute and Production from Bureau of Mines except latest year's reserves estimated by WORLD OIL and latest year's production includes estimates for November and December on basis of A.P.I. weekly reports.

continued development and expansion of previously discovered producing reservoirs. The estimats, as is customary in the U. S., refer solely to proved or blocked-out reserves. They include only oil recoverable under existing economic and operating conditions, and do not include probable future discoveries.

While the estimated proved U. S. reserves at the end of 1947 represented a new all-time record, the reserves position of the country remained relatively tight. In relation to current annual consuming rates, reserves at present are less ample than at the beginning of the war. Reserves at the end of 1947 were only 12 times greater than the year's annual crude production rate. This is the same ratio as in immediate preceding years, but in the years 1938-1942 the reserves were 14 times greater than annual production. In the mid-1920's the nation's reserves were even smaller in relation to producing rates than they are at present.

These figures serve only to measure the relationship of reserves and production. They, of course, do not demonstrate that

today's known underground oil supply can be produced in 12 years. Existing reserves can be recovered only over a much longer period of time and at gradually declining annual rates.

Hence the industry cannot relax in its search for additional new supplies if it is to maintain adequate producing ability to satisfy current needs. In fact, a less tight reserves position would be desirable. In view of enlarged production rates, the regaining of a position where the country has about 14 times as much reserves as it currently produces would require material stepping up of annual provings of new sources. A very intensive exploratory effort would be necessary for the next several years, along with full and prompt development of new fields as they are discovered. It does not appear that the industry can expect sufficient steel tubular goods to accomplish this feat for some years.

However, in view of the limitations imposed on drilling during the past six years, the nation's reserve position does not appear alarming despite the tremendous increase in production. Unquestionably, much additional oil would have been proved to exist during these years had the industry been able to drill as many wells as it desired. The fact that it has been able to maintain its reserve position so well in the face of rapidly rising usage while experiencing a six-year restriction on drilling speaks well for its ability to still find additional petroleum.

The industry's incentive to engage in the hazardous task of finding new oil fields has been given much impetus by price increases during the past year. Certainly, it would undertake the greatest exploratory development in all history if it could procure the equipment needed. Therefore, as more steel products become available the industry will assuredly intensify its search for additional petroleum reserves.

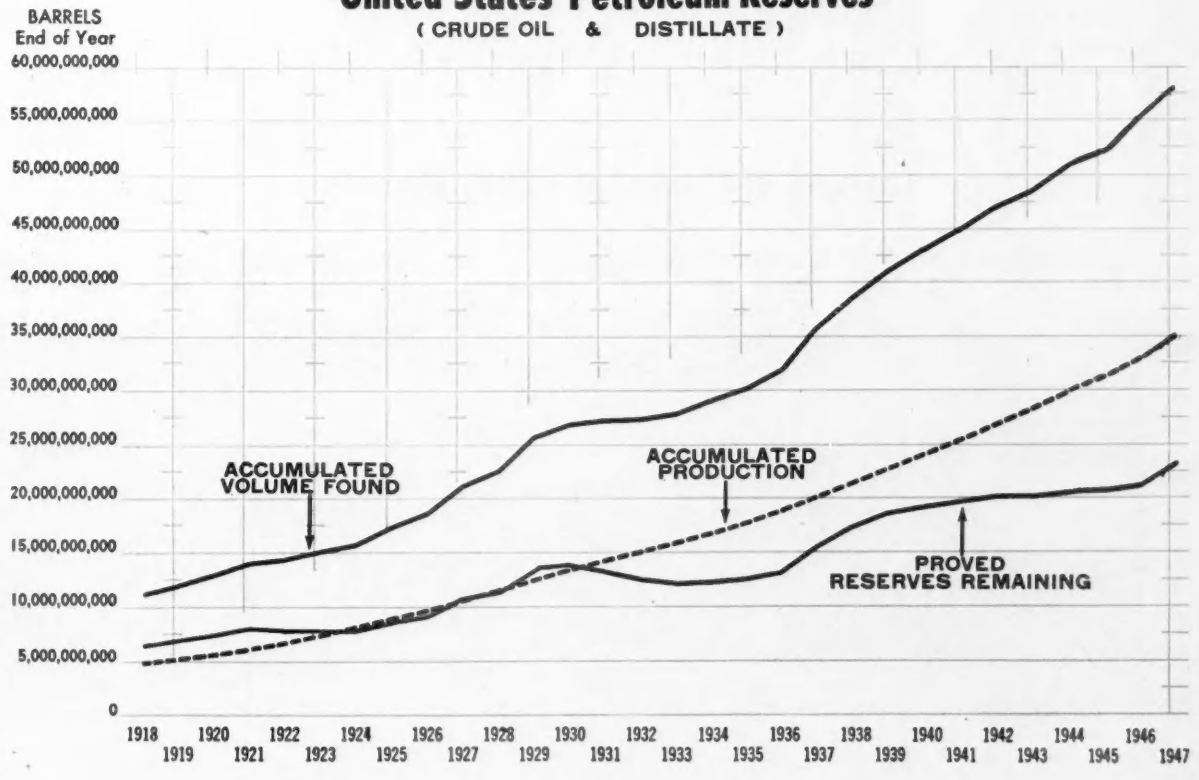
Judging by the results of 1947 and the prospect for some increase in drilling during 1948, it may be hoped that new reserves will be proved up in satisfactory volume this year, thus making it possible for the U. S. to produce the larger quantities which will be required in coming years.

Of the total reserves, 21,718,302,000 barrels are estimated to consist of crude oil and 1,348,274,000 barrels of condensate or distillate. During the past year crude reserves increased an estimated

■ CONTINUED ON PAGE 182

United States Petroleum Reserves

(CRUDE OIL & DISTILLATE)



End of Year	Accumulated Discoveries	Accumulated Production	Proved Reserves Remaining	End of Year	Accumulated Discoveries	Accumulated Production	Proved Reserves Remaining	End of Year	Accumulated Discoveries	Accumulated Production	Proved Reserves Remaining
1918	10,808,572,000	4,608,572,000	6,200,000,000	1928	22,243,149,000	11,243,149,000	11,000,000,000	1938	38,536,388,000	21,188,242,000	17,348,146,000
1919	11,686,939,000	4,986,939,000	6,700,000,000	1929	25,450,472,000	12,250,472,000	13,200,000,000	1939	40,936,216,000	22,453,204,000	18,483,012,000
1920	12,629,868,000	5,429,868,000	7,200,000,000	1930	26,748,483,000	13,148,483,000	13,600,000,000	1940	42,830,933,000	23,806,418,000	19,024,515,000
1921	13,702,051,000	5,902,051,000	7,800,000,000	1931	26,999,564,000	13,999,564,000	13,000,000,000	1941	44,797,942,000	25,208,646,000	19,589,296,000
1922	14,059,582,000	6,459,582,000	7,600,000,000	1932	27,084,723,000	14,784,723,000	12,300,000,000	1942	46,678,084,000	26,595,291,000	20,082,793,000
1923	14,791,989,000	7,191,989,000	7,600,000,000	1933	27,690,379,000	15,690,379,000	12,000,000,000	1943	48,165,056,000	28,100,904,000	20,064,152,000
1924	15,405,929,000	7,905,929,000	7,500,000,000	1934	28,775,444,000	16,598,444,000	12,177,000,000	1944	50,299,602,000	29,776,551,000	20,453,231,000
1925	17,169,672,000	8,669,672,000	8,500,000,000	1935	29,995,040,000	17,595,040,000	12,400,000,000	1945	52,316,839,000	31,490,206,000	20,826,813,000
1926	18,240,546,000	9,440,546,000	8,800,000,000	1936	31,758,127,000	18,694,727,000	13,063,400,000	1946	55,147,804,000	33,223,630,000	21,924,354,000
1927	20,841,675,000	10,341,675,000	10,500,000,000	1937	35,481,155,000	19,973,887,000	15,507,268,000	1947	58,143,192,000	35,076,796,000	23,066,576,000

Producing Depth Records Broken Twice During 1947

THE world's producing depth record was again broken in the U. S., as two wells exceeded the greatest depth from which production had been obtained previously. As operators continued to search deeper for additional oil reserves, new production marks also were established in several states and districts.

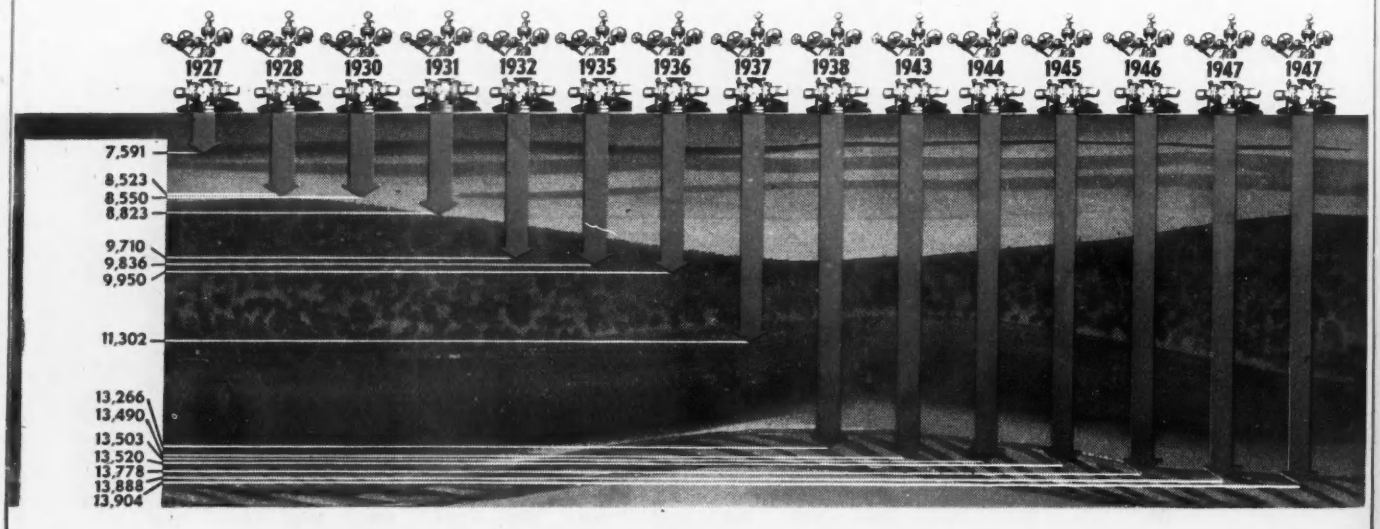
The producing depth record remained in South Louisiana, as it has since 1938, but by the end of 1947 had been pushed 126 feet deeper to 13,904 feet. First of the two wells to break the former record was Shell Oil Company's Smith-State 3, Weeks Island field, South Louisiana, which reached 13,888 feet, 110 feet deeper than its offset on the same lease which held the record at the end of 1946.

Before the end of the year, however, The Texas Company completed its La-Fourche Basin Levee District 1, Queen Bess Island field, South Louisiana, at a depth of 13,904 feet, and thus became the deepest producing well in the world.

The present record compares with 7591 feet in 1927 and with 9950 feet in 1936. It was not until 1937 that the first production was found below 10,000 feet. This occurred when the Rio Bravo field, California, became productive at 11,302 feet.

Four states now have production below 13,000 feet, and three of these established new depth marks during 1947. Outside of Louisiana, these states are California, Mississippi and Wyoming. California's deepest production is in the Wasco field, which has been producing from 13,175 feet since 1938. Production was established the past year at 13,082 feet in the West Ovett field of Mississippi, in contrast with a producing depth of 11,772 feet a year previously. Wyo-

Changes in Producing Depth Records



Year	Well and Location	Feet
1927	E. J. Miley's Athens 6, Rosecrans field, California	7,591
1928	Texon Oil and Land Company's University 1-B, Big Lake field, West Texas	8,523
1930	Star Petroleum Company's Colby 2, Long Beach, California	8,550
1931	Tide Water Associated Oil Company's Lloyd 57, Ventura Avenue, California	8,823
1932	Tide Water Associated Oil Company's Lloyd 83, Ventura Avenue, California	9,710
1935	Tide Water Associated Oil Company's Lloyd 131, Ventura Avenue, California	9,836
1936	The Texas Company's Lafitte 5, Lafitte field, Southern Louisiana	9,950
1937	Union Oil Company's Kernco 1-34, Rio Bravo field, Kern County, California	11,302
1938	Fohs Oil Company's Buckley-Bourg 1, DeLarge field, Southern Louisiana	13,266
1943	Union Producing Company's Fitzpatrick-Vizard 1, DeLarge field, Southern Louisiana	13,490
1944	Union Producing Company-Fohs Oil Company's Buckley-Bourg 2, DeLarge field, Southern Louisiana	13,503
1945	Shell Oil Company's Smith State 1, Weeks Island field, Southern Louisiana	13,520
1946	Shell Oil Company's Smith-State 2, Weeks Island field, Southern Louisiana	13,778
1947	Shell Oil Company's Smith-State 3, Weeks Island field, Southern Louisiana	13,888
1947	The Texas Company's LaFource Basin Levee District 1, Queen Bess Island field, Southern Louisiana	13,904

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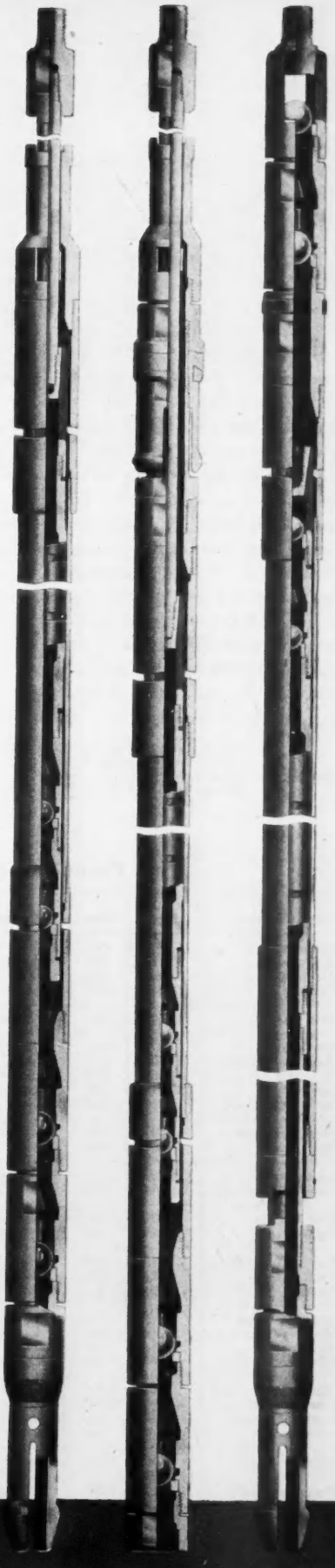
View of the IMPROVED INSERT pump barrel, showing how super-hard wearing surfaces for long life are combined with ductile core for high tensile strength.



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ming entered the 13,000-foot producing list when a well in the Church Butte field was completed at 13,050 feet. This state's deepest production was 10,721 feet a year ago.

The year saw 12,000-foot production discovered for the first time in Texas, with the completion of a producing wildcat at 12,022 feet in Upton County, West Texas. However, this was only slightly deeper than the 11,955 feet producing record of this district at the end of 1946.

Eight states now have production from formations more than 10,000 feet below the surface. Aside from Louisiana, California, Mississippi, Wyoming and Texas, the states of New Mexico, Oklahoma and Florida have production from 11,928 feet, 11,736 and 11,626 feet, respectively.

Outside of West Texas, the Upper Coast, Lower Coast and East Texas are other Texas districts with production below 10,000 feet. North Louisiana as well as its sister district, South Louisiana, also has 10,000-foot production.

No other state or district has production exceeding 10,000 feet in depth. Missouri continues to hold the shallowest producing depth record of any state.

Petroleum Reserves

■ CONTINUED FROM PAGE 179

844,742,000 barrels and condensate by 297,480,000 barrels.

Considerably more than half of U. S. crude reserves are in Texas. The state had 12,271,213,000 barrels of crude reserves at the end of the year, or approximately four times more than any other state. Texas also accounted for about two-thirds of the additions made to crude reserves during the year, having 624,853,000 barrels more than a year ago.

Despite a 60 percent increase in crude production during the last ten years, Texas has been able to increase its reserves by 50 percent since the end of 1937. The state's estimated proved reserves totaled 8¼ billion barrels at the end of 1937 in contrast with its present reserve of slightly more than 12¼ billion barrels. During the same period of time, the nation's known crude reserves have increased by little more than 6 billion barrels (from 15½ billion to its present of nearly 21¾ billion barrels).

Second largest increase in crude oil reserves occurred in Louisiana, the discovery of 258,760,000 barrels of new oil exceeding production by 99,484,000 barrels. This raised the state's proved remaining crude reserves to 1,751,281,000 barrels, which makes it the third-ranking state.

California found only a modest amount more than it produced but still retained its rank as the second largest reserve in the nation. The state's reserves at the end of 1947 were estimated at 3,309,283,000 barrels of crude oil, an increase of 15,792,000 barrels from the end of the preceding year.

Mississippi and Colorado experienced successful years. Reserves in Mississippi were raised to 307,319,000 barrels when 37,097,000 barrels more than produced were proved by drilling operations. Colorado increased its reserve volume by 32,609,000 barrels, and had a remaining reserve of 332,479,000 barrels at the end of the year.

New Mexico discovered 25,489,000 barrels more than it produced, and Oklahoma boosted its reserves by 17,960,000 barrels. Other states which had modest increases were Kansas and Kentucky, which registered gains of 10,803,000 and 2,256,000 barrels, respectively.

Producing Depth Records in U. S. by States and Districts

State or District	Feet	Year	Formation	Well Location and Remarks
South Louisiana	13,904	1947	Miocene	The Texas Co.'s LaFourche Basin Levee District 1, Queen Bess Island field, Jefferson Parish. (Condensate).
California	13,175	1938	Miocene	Continental Oil Company's KCL A-2, Wasco field, Kern County. (Oil).
Mississippi	13,082	1947	L. Cretaceous	Gulf Refining Company's L. L. Majors 1, West Ovett field, Jones County. (Oil).
Wyoming	13,050	1947	Dakota	Mountain Fuel Supply Company's Unit 3, Church Butte field, Uinta County. (Condensate).
West Texas	12,022	1947	Ellenburger	Plymouth Oil Company-Slick-Urschel Oil Company's D. L. Alford 1, Upton County. (Oil).
New Mexico	11,928	1944	Ellenburger	Humble Oil & Refining Company's Leonard-Gov't. 1, Dublin field, Lea County. (Oil).
Upper Texas Coast	11,805	1943	Wilcox	Superior Oil Co.'s South Texas Development Company 1, Lake Creek field, Montgomery County. (Oil)
Oklahoma	11,736	1946	Pennsylvania	Magnolia Petroleum Company's Spiers 1, Chitwood field, Grady County. (Oil).
Florida	11,626	1943	Glen Rose	Humble Oil & Refining Company's Gulf Coast Realty 1, Sunniland field, Collier County. (Oil).
Lower Texas Coast	11,192	1945	Wilcox	Sun Oil Company's R. A. Thompson 1, West Goliad field, Goliad County. (Oil).
North Louisiana	10,740	1946	Smackover	Ohio Oil Company's W. E. Deloach 3-H, Haynesville field, Claiborne Parish. (Condensate).
East Texas	10,312	1942	Pettit	Humble Oil & Refining Company's Curtis 1, Larissa field, Cherokee County. (Oil).
Arkansas	9,320	1944	Smackover	Tide Water Associated Oil-Seaboard Oil Company's Bendaw 1, Patton field, Lafayette County. (Oil).
South Central Texas	9,018	1946	Edwards	Quintana Petroleum Corporation's C. Muil 3, Muil field, Atascosa County. (Oil).
West Virginia	8,410	1946	Oriskany	Ohio Oil Company's Kuykendall et al 1, Dry Fork District, Tucker County. (Gas).
Pennsylvania	8,009	1946	Oriskany	Railway Steel Spring Co.'s L. C. Steiner 1, Unity Township, Westmoreland County. (Gas).
East Texas Border	7,586	1946	Travis Peak	Magnolia Petroleum Company's S. L. Orr 1, Lassater field, Marion County. (Oil).
North Texas	7,415	1945	Basal Strawn	Magnolia Petroleum Company's Joe Dillard 1, Sivels Bend field, Cooke County. (Oil).
Colorado	7,198	1941	Morrison	Texas Company-California Company's Unit 10, Wilson Creek field, Rio Blanco County. (Oil).
Southwest Texas	6,922	1944	Wilcox	Edwin M. Jones Estell C-2, San Caja field, McMullen County. (Condensate).
Montana	6,795	1947	Madison	Sinclair-Wyoming Oil Company's Wilkins 1, Elk Basin field, Carbon County. (Oil).
Kansas	6,485	1936	Viola	Olson Drilling Company's Morrison 3, Morrison field, Clark County. Abandoned in 1946). (Oil).
West Central Texas	6,065	1940	Mississippian	J. D. Sandefer Jr., et al (was Shell Oil Co.'s) T. K. Smith 1, Aspermont field, Stonewall County. (Oil).
Ohio	5,839	1946	Clinton	Frank Lyons' Anita B. Wright 1, Hanover Township, Columbiana County . (Gas).
New York	5,222	1942	Oriskany	E. Kent Kane's Robert Lewis 1, West Union Township, Steuben County. (Gas).
Eastern Kentucky	5,170	1932	Devonian	United Carbon Company's Howe 1, Pike County. (Gas).
Michigan	5,100	1946	Richfield	Pure Oil Company's Freer 1, Orient field, Clare County. (Condensate).
Illinois	4,780	1943	Trenton	Kingwood Oil Company's Shanafelt 24-A, Salem field, Marion County. (Oil).
Texas Panhandle	3,830	1929	Permian	Canadian River Gas Company's Bivens 9-A, Hartley County. (Gas).
Alabama	3,624	1945	Eutaw	Hunt Oil Company's Robert Land 4, Gilbertown field, Choctaw County. (Oil).
Indiana	3,011	1946	McClosky	H. E. Ledbetter et al's Noble Utley 1, Springfield Consolidated field, Posey County. (Oil).
Nebraska	2,900	1942	Hunton	Skelly Oil Company's Wiltse 1, Dawson field, Richardson County. (Oil).
Western Kentucky	2,840	1944	McClosky	Ashland Oil & Refining Company's Johnson 2, 13-0-12, Raleigh field, Union County. (Oil).
Tennessee	1,617	1920	Knox	Harbor Oil Company's Sells 1, Pickett County. (Oil).
Missouri	1,444	1940	Bartlesville	Cities Service Oil Company's Jim Cook 1, Tarkio field, Atchison County. (Oil).

Record Daily Output Reached by U. S. Producing Oil Wells

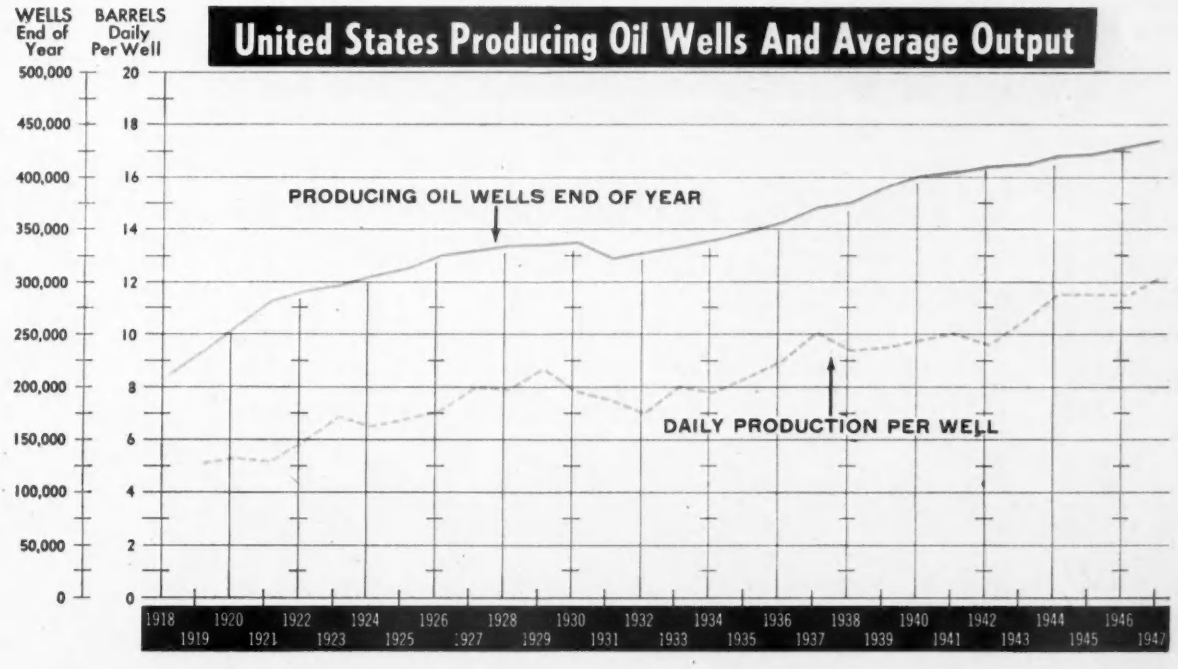
THE U. S. experienced only a modest increase in number of oil producing wells the past year. Consequently, in producing a substantially enlarged peak quantity of crude, daily average output per well rose rather sharply to the highest level of all times.

The number of producing oil wells in the U. S. reached a total of 428,522 at the end of 1947, a figure which represented an increase of 4221 over the 424,301 producing at the end of 1946.

New oil wells completed through drilling operations during the year totaled 17,478, the increase of only 4221 in total number of producing wells therefore indicating that 13,257 wells were depleted and abandoned or shut in for other reasons during the year.

The increase in number of producing oil wells represented a gain of slightly less than 1 percent in contrast with a 6.9 percent growth in production. Hence, to obtain the enlarged crude production it was necessary for wells to produce at higher rates. National daily average output per well for the year rose to 11.9 barrels in contrast with 11.3 barrels per well per day during 1946 and 1945. This constituted the highest daily yield per well on record.

By the end of the year, daily production per well for the nation had in-



YEAR	Number of Producing Oil Wells At End of Year	Gain In No. Producing Oil Wells	New Oil Wells Completed in Year	Production Per Well Per Day During Year
1918....	203,375	.....	17,860	.....
1919....	227,000	23,625	21,041	4.8
1920....	251,000	24,000	24,278	5.0
1921....	274,500	23,500	14,715	4.9
1922....	284,880	10,380	17,790	5.7
1923....	290,100	5,220	16,182	6.6
1924....	299,100	9,000	14,707	6.2
1925....	306,100	7,000	17,029	6.5
1926....	318,600	12,500	18,626	6.8
1927....	323,300	4,700	14,382	7.7
1928....	327,800	4,500	12,348	7.6
1929....	328,200	400	15,362	8.4
1930....	331,070	2,870	11,693	7.5
1931....	315,850	*15,220	7,011	7.2
1932....	321,500	5,650	10,530	6.7
1933....	326,850	5,350	8,070	7.7
1934....	333,070	6,220	13,119	7.5
1935....	340,990	7,920	15,418	8.1
1936....	349,450	8,460	18,704	8.7
1937....	363,030	13,580	23,115	9.8
1938....	369,640	6,610	19,106	9.1
1939....	380,390	10,750	17,734	9.2
1940....	389,010	8,620	19,843	9.6
1941....	399,960	10,950	19,590	9.7
1942....	404,840	4,880	10,977	9.4
1943....	407,170	2,330	9,887	10.2
1944....	412,220	5,050	13,502	11.2
1945....	415,750	3,530	13,944	11.3
1946....	424,301	8,551	16,087	11.3
1947....	428,522	4,221	17,478	11.9

* Only decrease of recent time, reflecting abandonment or shutting in of many wells when early chaotic development of East Texas field, coupled with business despression, severely depressed crude prices.

SOURCE: Producing well data for 1918-1945 from U. S. Bureau of Mines, with more recent years by World Oil (and predecessor, The Oil Weekly) with cooperation of state conservation officials and others. Completion data since 1920 from records of World Oil (and predecessor, The Oil Weekly), earlier years from Bureau of Mines Daily average production per well obtained by dividing daily average production of nation for year by average number of wells producing during year, that is, between January 1 and December 31.

creased further to an average of 12.3 barrels, compared with 11.2 barrels per well at the end of 1946. This figure becomes significant when it is recalled that the nation's average daily recovery per well did not reach ten barrels daily until the war year of 1943.

Only 11.5 percent of the producing wells were flowing naturally. The number of wells that produced their yield by natural flow rose from 48,387 at the end of 1946 to 49,399 at the close of the past year, a gain of 1012.

Wells producing their recovery by artificial means (pumping or air-gas lift) totaled 379,123 at the close of 1947, a gain of 3209 during the 12-month period.

Mississippi had the best per well producing rate of any state having more than 500 wells. This state's production at the end of the year was equivalent to an average of 105.6 barrels daily for each of its 1052 producing wells. An unusually big portion of Mississippi's wells were flowing, its 416 flowing wells being approximately 40 percent of its total.

Next to Mississippi in yield per well came Colorado with a year-end average of 85.5 barrels daily for each of its 538 producing oil wells. This represented a decline of 8.6 barrels per well per day from a year ago.

The number of producing oil wells in Texas increased by 2220 from a year previous, thus accounting for slightly more than one-half of the nation's gain in producing wells. This state was the site of almost one-fourth of all the producing oil wells in the country. Texas' 104,979 producing wells compared with 82,800 in Pennsylvania and 51,890 in Oklahoma. No other state had more than 30,000 producing oil wells.

A majority of the nation's flowing wells were located in Texas, this state having 37,070 flowing wells, or three-fourths of the 49,379 in the U. S. However, Texas had 11 fewer flowing wells at the end of 1947 although the national total had increased by 1012. New Mexico was largely responsible for the country's growth in flowing wells, having 631 more than a year previous. At the end of 1947, there were 3636 flowing wells in New Mexico, or slightly less than three-fourths of the state's 5031 wells.

Among the bigger producing states, Louisiana had the best per well output, with a record of producing an average of 59.0 barrels daily for each of its 7684 wells. A large part of this state's wells also produced natural flow, there being 3168 in this classification.

California's 25,155 wells had a good producing record, yielding an average of 36.9 barrels each per day.

Texas' production rate was equal to 22.4 barrels per day for each of its 104,979 oil wells, placing it well up among those with better than national averages.

Oklahoma, another big producing state, was yielding an average of only 7.9 barrels daily per well at the end of the year.

All the Appalachian district states were producing less than one barrel per day per well, and none of their wells were flowing naturally. Within the states of Ohio, New York, Pennsylvania and West Virginia were a total of 145,675 wells, or one-third of all the oil wells currently producing in the U. S.

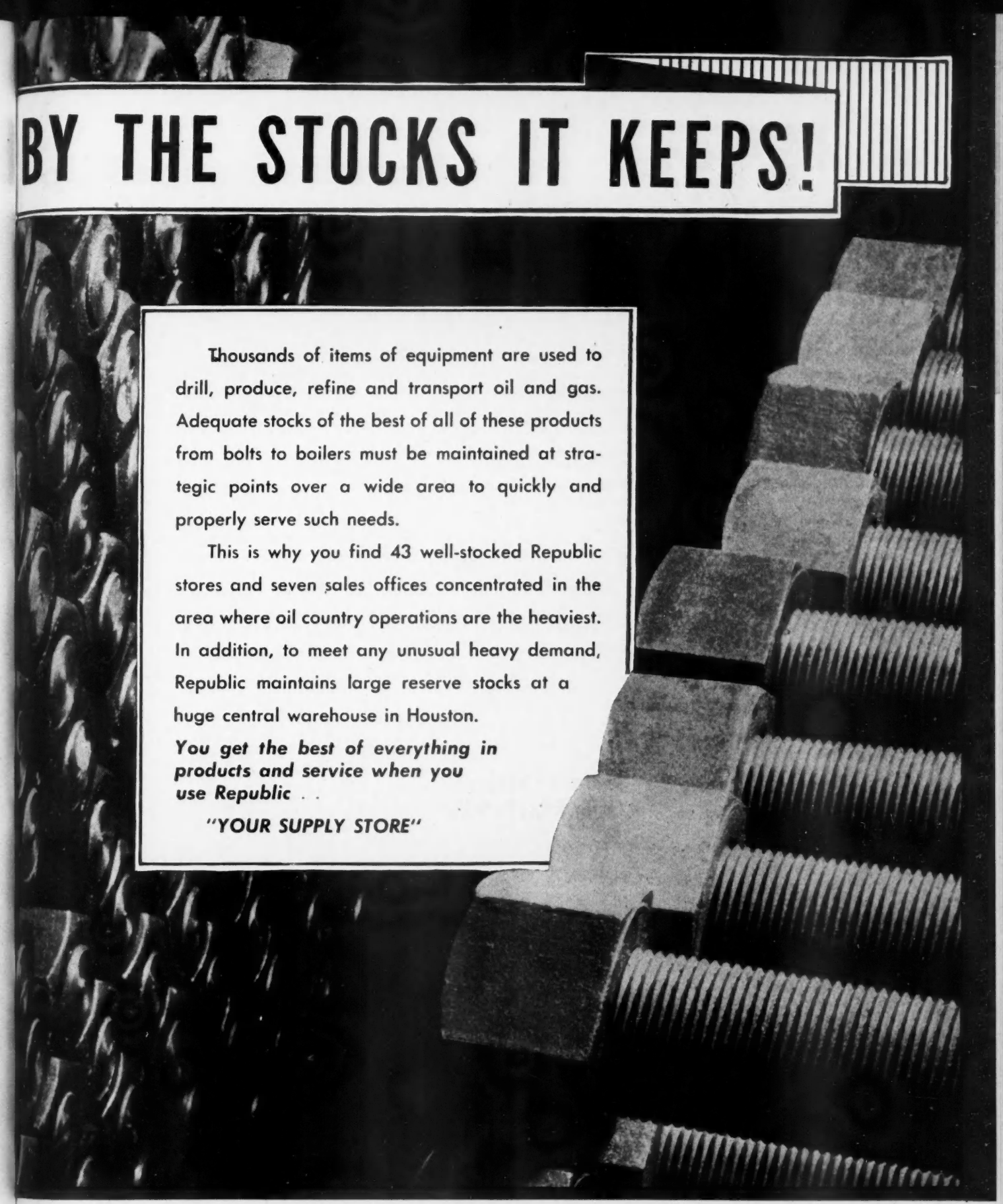
Active Producing Oil Wells, Methods of Producing, and Average Output per Well, By States and Districts, at End of 1947 and 1946

Data represent only active crude oil producing wells, including no gas wells, no inactive or shut-in oil wells, and only several hundred gas-condensate wells, mostly in Louisiana.

(Compiled by WORLD OIL, with cooperation of state conservation departments and other collaborators.)

STATE OR DISTRICT	FLOWING OIL WELLS			OIL WELLS PRODUCING BY ARTIFICIAL LIFT			TOTAL PRODUCING OIL WELLS			DAILY AVERAGE PRODUCTION PER WELL AT END OF YEAR		
	End of 1946	End of 1947	Wells Diff.	End of 1946	End of 1947	Wells Diff.	End of 1946	End of 1947	Wells Diff.	1946	1947	Percent Change
Alabama	1	.....	— 1	26	33	+ 7	27	33	+ 6	35.9	40.5	+12.8
Arkansas	451	378	— 73	2,836	2,992	+ 156	3,287	3,370	+ 83	23.7	23.8	+ 0.4
California	1,894	2,363	+ 469	20,991	22,792	+1,801	22,885	25,155	+2,270	38.5	36.9	— 4.2
San Joaquin Valley	1,126	1,284	+ 158	11,580	12,536	+ 956	12,706	13,820	+1,114	33.3	31.3	— 6.0
Coastal District	383	483	+ 100	2,041	2,400	+ 359	2,424	2,883	+ 459	58.5	54.7	— 6.5
Los Angeles Basin	385	596	+ 211	7,370	7,856	+ 486	7,755	8,452	+ 697	40.6	39.9	— 1.7
Colorado	87	127	+ 40	293	411	+ 118	380	538	+ 158	93.5	85.5	— 8.6
Florida	2	4	+ 2	1	1	.....	3	5	+ 2	83.3	145.2	+74.3
Illinois	89	68	— 21	28,907	28,405	— 502	28,996	28,473	— 523	7.0	6.2	—11.4
Indiana	4	2	— 2	2,153	2,807	+ 654	2,157	2,809	+ 652	8.5	6.5	—23.5
Kansas	106	85	— 21	27,139	26,846	— 293	27,245	26,931	— 314	10.0	10.6	+ 6.0
Kentucky	3	.....	— 3	14,621	14,509	— 112	14,624	14,509	— 115	2.0	1.9	— 5.0
Louisiana	3,276	3,168	— 108	4,819	4,516	— 303	8,095	7,684	— 411	51.6	459.0	+14.3
North Louisiana	820	925	+ 105	3,757	3,478	— 279	4,577	4,403	— 174	21.7	24.6	+13.4
South Louisiana	2,456	2,243	— 213	1,062	1,038	— 24	3,518	3,281	— 237	90.4	105.2	+16.4
Michigan	340	276	— 64	3,135	3,356	+ 221	3,475	3,632	+ 157	13.6	13.4	— 1.5
Mississippi	218	416	+ 198	568	636	+ 68	786	1,052	+ 266	106.7	105.6	— 1.0
Missouri	.....	.....	.....	38	36	— 2	38	36	— 2	3.6	4.5	+25.0
Montana	26	24	— 2	2,573	2,455	— 118	2,599	2,479	— 120	9.4	10.0	+ 6.4
Nebraska	.....	.....	.....	58	55	— 3	58	55	— 3	12.4	9.1	—26.6
New Mexico	3,005	3,636	+ 631	1,594	1,395	— 199	4,599	5,031	+ 432	22.6	23.9	+ 5.8
New York	.....	.....	.....	22,225	23,000	+ 775	22,225	23,000	+ 775	0.6	0.6	.....
Ohio	65	50	— 15	22,907	22,825	— 82	22,972	22,875	— 97	0.4	0.4	.....
Oklahoma	1,512	1,485	— 27	51,288	50,405	— 883	52,800	51,890	— 910	7.1	7.9	+11.3
Pennsylvania	.....	.....	.....	82,998	82,800	— 198	82,998	82,800	— 198	0.4	0.4	.....
Tennessee	.....	.....	.....	22	22	.....	22	22	.....	1.6	1.5	— 6.3
Texas	37,081	37,070	— 11	65,678	67,909	+2,231	102,759	104,979	+2,220	19.4	22.4	+15.5
District 1: South Central Texas	117	208	+ 91	3,132	3,057	— 75	3,249	3,265	+ 16	5.8	7.6	+31.0
District 2: Refugio District	2,508	2,723	+ 215	775	833	+ 58	3,283	3,556	+ 273	41.1	46.1	+12.2
District 3: Upper Gulf Coast	4,982	4,920	— 62	3,250	3,473	+ 223	8,232	8,393	+ 161	51.3	58.1	+13.3
District 4: Lower Gulf-Laredo District	3,560	3,854	+ 294	5,194	5,147	— 47	8,754	9,001	+ 247	23.9	28.7	+20.1
District 5: East Central Texas	295	342	+ 47	1,398	1,344	— 54	1,693	1,686	— 7	49.9	25.1	—49.7
District 6: Northeast Texas	14,939	14,187	— 752	10,636	11,196	+ 560	25,575	25,383	— 192	16.2	16.3	+ 0.6
District 7-B: North Central Texas	651	760	+ 109	6,312	6,290	— 22	6,963	7,050	+ 87	5.0	6.0	+20.0
District 7-C: West Texas	152	186	+ 34	1,297	1,404	+ 107	1,449	1,590	+ 141	19.1	26.0	+36.1
District 8: West Texas	8,584	8,855	+ 271	8,761	9,966	+1,205	17,345	18,821	+1,476	28.8	34.5	+19.8
District 9: North Texas	1,250	986	— 264	18,838	18,921	+ 83	20,088	19,907	+ 181	5.9	6.9	+16.9
District 10: Texas Panhandle	43	49	+ 6	6,085	6,278	+ 193	6,128	6,327	+ 199	13.2	14.1	+ 6.1
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Virginia	.....	.....	.....	15	12	— 3	15	12	— 3	13.3	3.3	—75.2
West Virginia	.....	.....	.....	17,211	17,000	— 211	17,211	17,000	— 211	0.4	0.4	.....
Wyoming	227	247	+ 20	3,818	3,905	+ 87	4,045	4,152	+ 107	25.0	32.0	+28.0
Total United States	48,387	49,399	+1,012	375,914	379,123	+3,209	424,301	428,522	+4,221	11.2	12.3	+ 9.8

BY THE STOCKS IT KEEPS!



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Refinery Output Must Be Stepped Up

U. S. REFINERIES were operated at maximum rates during 1947, producing record quantities of petroleum products in an effort to make adequate supplies available to consumers. With increased demand forecast and stocks of refined products uncomfortably small, U. S. refineries again will process record volumes during the current year.

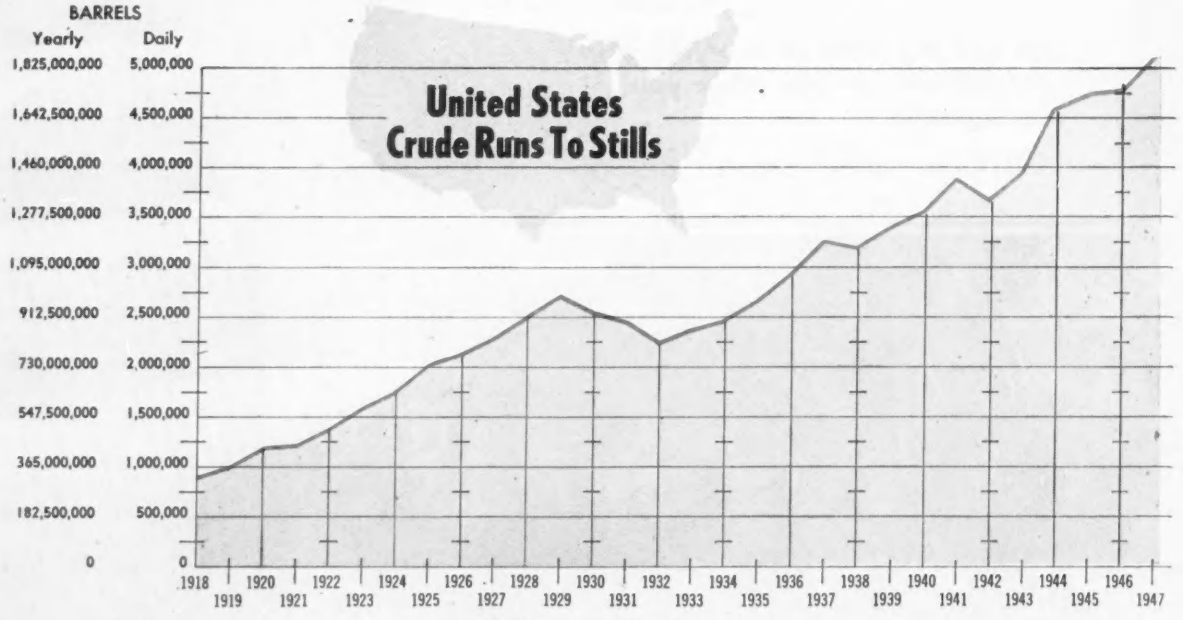
During 1947 a total of 1,849,931,000 barrels of crude oil was run to refining stills, an average of 5,068,000 barrels daily. This represented an increase of 6.9 percent or 328,000 barrels daily over 1946 levels, and was 1,200,000 barrels per day greater than in 1941.

To process such a large amount of crude oil it was necessary for an unusually large percent of the nation's refining capacity to be utilized. Approximately 90 percent of the country's refining capacity was in constant use during the year, compared with a normal utilization of approximately 85 percent, indicating the effort made to reduce shutdowns for repairs or emergencies.

The inability of refining plants to refine large quantities was the greatest single contributing cause of the shortage of petroleum supplies in the U. S. The quantity that can be charged to stills also will be the primary controlling factor in determining how well the industry will be able to meet enlarged demand requirements during 1948. Some additional refining capacity will become available, but it will not be sufficient to answer all needs.

At the end of 1947 the nation's refining capacity had been increased to 5,671,000 barrels per day in contrast with 5,559,000 barrels 12 months previous. And at the end of 1947 there was 93.9 percent of the existing capacity being used in contrast with only 86 percent at the close of 1946. Consequently, the amount of crude oil charged to refining stills in December averaged 5,324,000 barrels per day in contrast with the year's average of 5,069,000 barrels. Nevertheless, not enough petroleum products were being refined, so sharply had consumption increased.

Proper adjustment of yields to varying increases in consumption of different petroleum products was a major headache in 1947, particularly in the last quarter,



(All Figures In Barrels)

YEAR	Annual Total	Daily Average	YEAR	Annual Total	Daily Average	YEAR	Annual Total	Daily Average	YEAR	Annual Total	Daily Average
1918	326,025,000	893,200	1926	779,264,000	2,135,000	1934	895,636,000	2,453,800	1942	1,334,103,000	3,655,000
1919	361,520,000	990,500	1927	828,835,000	2,270,800	1935	965,790,000	2,646,000	1943	1,429,738,000	3,917,000
1920	433,915,000	1,185,600	1928	913,295,000	2,495,300	1936	1,068,570,000	2,919,000	1944	1,665,684,000	4,551,000
1921	443,363,000	1,214,700	1929	987,708,000	2,706,100	1937	1,183,440,000	3,242,000	1945	1,719,534,000	4,711,000
1922	500,706,000	1,371,800	1930	927,447,000	2,541,000	1938	1,165,015,000	3,191,800	1946	1,730,197,000	4,740,000
1923	581,238,000	1,592,400	1931	894,608,000	2,451,000	1939	1,237,840,000	3,391,000	1947	1,849,931,000	5,068,000
1924	643,719,000	1,758,800	1932	819,997,000	2,240,400	1940	1,294,283,000	3,536,300			
1925	739,920,000	2,027,200	1933	861,254,000	2,359,600	1941	1,409,192,000	3,860,800			

Source:—U. S. Bureau of Mines, except for latest year which has been calculated from Bureau statistics for first 10 months and American Petroleum Institute weekly reports for the last two months.

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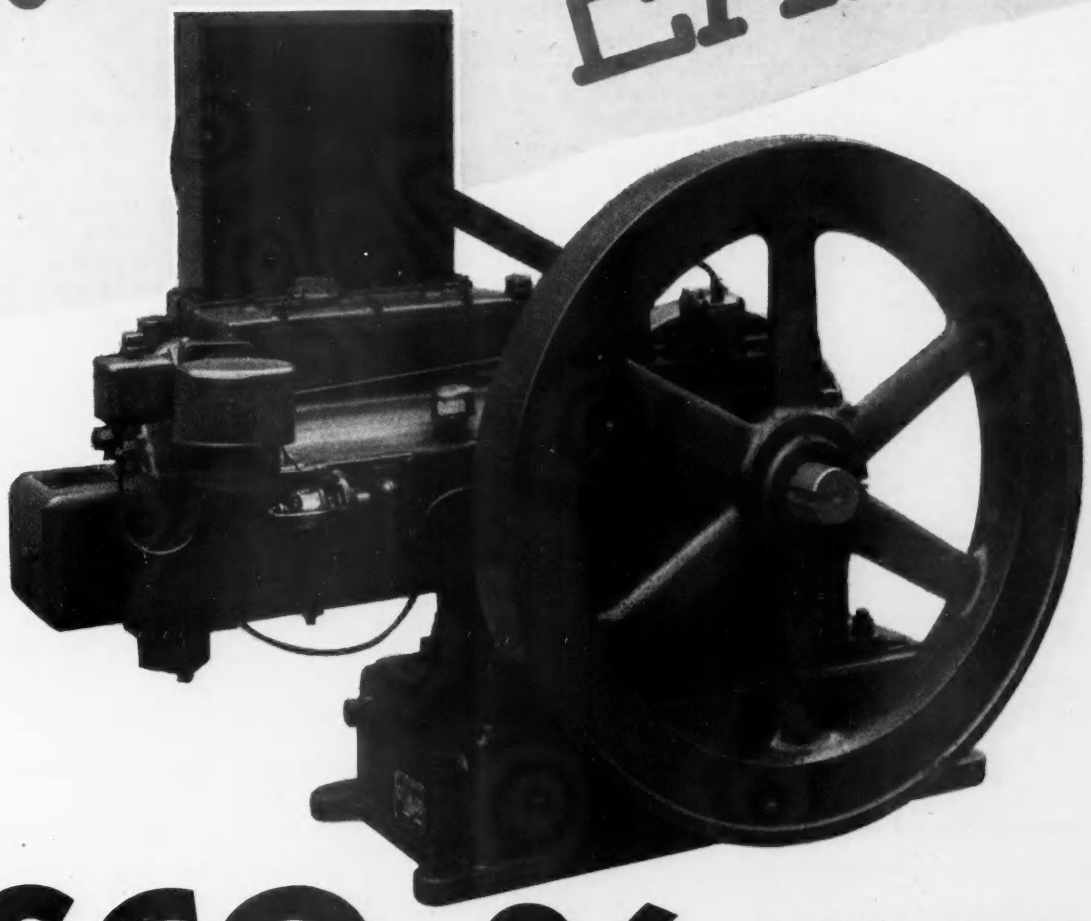

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and unquestionably will be equally serious during 1948. Consumption of fuel oils, kerosine and lubricants has increased more rapidly since 1941 than gasoline, the other major product, and to satisfy demand requirements as nearly as possible refiners reduced gasoline yields to produce larger amounts of other products.

Chief concern the past year was the problem of manufacturing enough gasoil and distillate fuel oils to satisfy requirements. Production of distillate fuel oils, which include heating oils, necessarily has been increased more rapidly since 1941 than output of other products. By adjusting upward the amount of distillate fuel recovered from crude run to stills, refiners were able to produce 309,927,000 barrels of this product last year. This was equivalent to a daily average yield of 849,000 barrels, an increase of 7.6 percent over the 789,000 barrels produced daily in 1946, and 63.8 percent more than the 518,000 barrels produced daily in 1941.

Consumption of distillate fuel oils continued to rise so sharply that refiners found it necessary to make additional upward adjustments by the end of the year. In December, distillate fuel oil production averaged 952,000 barrels daily, which was 147,000 barrels per day more than in the last month of the preceding year. The percent of crude oil converted into distillate fuel products in December amounted to 17.9 percent of the crude run to stills, in contrast with 16.9 percent of the crude made into these products in December, 1946.

The record-breaking quantity of distillate fuel oils produced was not sufficient to satisfy demand, and stocks of these products at the close of the year were 9 million barrels less a year previous.

Production of gasoline (including straight run, cracked and natural blended at refineries) during 1947 totaled 814,150,000 barrels, or 2,231,000 barrels daily. At this level it was 8.8 percent more than the 2,050,000 barrels manufactured daily in 1946. This was the highest percent gain for the year of any of the major petroleum products, but still the growth of gasoline production since 1941 has been smaller than any other major petroleum product, having gained but 21.3 percent. This rate of producing gasoline permitted stocks of this product to be maintained during the year, there having been 92,886,000 barrels of gasoline in storage at the end of 1947 in comparison with 92,742,000 barrels a year previous.

Refinery Production of Major Products and Percent Yield from Crude Run at U. S. Refineries

Results in December and Year, 1947, compared with same periods in 1946 and 1941. Figures are from Bureau of Mines except that November and December, 1947, are estimated with aid of A.P.I. weekly bulletins.

(THOUSANDS OF BARRELS)

ITEM	1941	1946	1947	% Diff. '41-'47	% Diff. '46-'47
***Gasoline:**					
Production, December	61,640	67,200	72,202	+17.1	+ 7.4
(Daily Average)	1,988	2,168	2,329	+17.1	+ 7.4
Percent Yield from Crude	45.7	41.4	39.8	.....	.....
Production, Whole Year	671,110	748,411	814,150	+21.3	+ 8.8
(Daily Average)	1,839	2,050	2,231	+21.3	+ 8.8
Kerosine:					
Production, December	6,682	8,782	10,255	+53.5	+16.8
(Daily Average)	215	283	331	+53.5	+16.8
Percent Yield from Crude	5.3	5.9	6.2	.....	.....
Production, Whole Year	72,586	104,385	110,502	+52.2	+ 5.9
(Daily Average)	199	286	303	+52.2	+ 5.9
Distillate Fuel Oil:					
Production, December	17,142	24,970	29,514	+72.2	+18.2
(Daily Average)	553	805	952	+72.2	+18.2
Percent Yield from Crude	13.7	16.9	17.9	.....	.....
Production, Whole Year	189,177	287,896	309,927	+63.8	+ 7.6
(Daily Average)	518	789	849	+63.8	+ 7.6
Residual Fuel Oil:					
Production, December	31,127	35,937	39,962	+28.4	+11.2
(Daily Average)	1,004	1,159	1,289	+28.4	+11.2
Percent Yield from Crude	24.9	24.3	24.2	.....	.....
Production, Whole Year	342,367	431,364	447,243	+30.6	+ 3.6
(Daily Average)	938	1,182	1,225	+30.6	+ 3.6
Lubricants:					
Production, December	3,554	4,135	4,294	+20.8	+ 3.8
(Daily Average)	115	133	139	+20.8	+ 3.8
Percent Yield from Crude	2.8	2.8	2.6	.....	.....
Production, Whole Year	39,539	45,645	51,320	+29.8	+12.4
(Daily Average)	108	125	141	+29.8	+12.4

* Production includes straight run, cracked, and natural blended at refineries. Yield indicates precent of crude runs made into straight run and cracked gasoline.

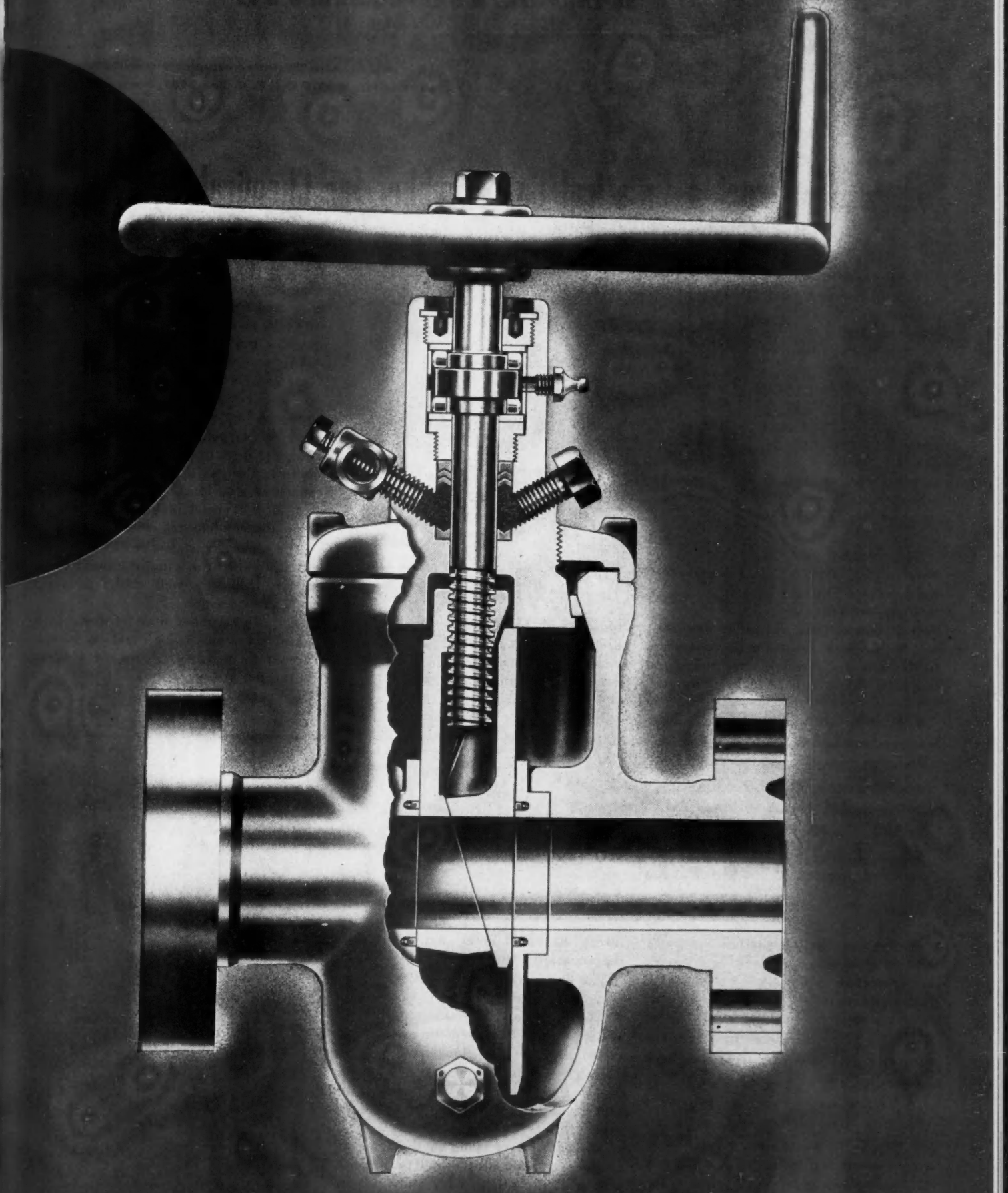
Crude Runs to Stills at U. S. Refineries and Percent of Refinery Capacity Used, By Districts, December and Years, 1941, 1946, and 1947

Runs from Bureau of Mines, except November and December, 1947, from American Petroleum Institute; Capacities from American Petroleum Institute.

(THOUSANDS OF BARRELS)

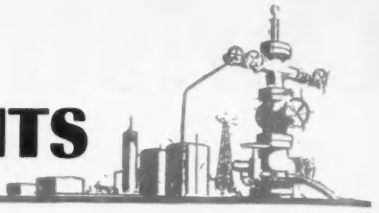
	CRUDE RUN IN DECEMBER							REFINING CAPACITY AND USE IN DECEMBER						CRUDE RUN DURING YEAR						
	Total Amount Run During Month				Daily Average Run During Month			Daily Capacity			Percent Capacity Used			Total Amount Run During Year			Daily Average Run During Year			
Refining District	Dec. 1941	Dec. 1946	Dec. 1947	% Diff. 1946-1947	Dec. 1941	Dec. 1946	Dec. 1947	Dec. 1941	Dec. 1946	Dec. 1947	Dec. 1941	Dec. 1946	Dec. 1947	1941	1946	1947	1941	1946	1947	% Diff. 1946-1947
East Coast	19,750	23,343	25,357	+ 8.6	637	753	818	704	839	819	90.5	89.7	99.9	217,046	276,651	296,379	595	758	812	+ 7.1
Appalachian	4,575	4,960	5,251	+ 5.9	148	160	169	174	205	188	85.1	78.0	89.9	53,499	55,756	60,497	147	153	166	+ 8.5
District No. 1	.....	3,020	3,079	+ 2.0	.....	97	99	.....	143	123	.....	67.8	80.5	.....	35,049	35,980	.....	96	99	+ 3.1
District No. 2	.....	1,940	2,172	+12.0	.....	63	70	.....	62	65	.....	101.6	107.7	.....	20,707	24,517	.....	57	67	+17.5
Ill., Ind., Ky	22,078	23,710	26,393	+11.3	712	765	851	776	870	949	91.8	87.9	89.7	251,257	279,810	300,507	688	767	823	+ 7.3
Okla., Kan., Mo.	10,711	11,887	13,822	+16.3	346	383	446	418	469	454	83.3	81.7	98.2	127,130	138,385	153,741	348	379	421	+11.1
Texas Inland	5,761	6,689	7,810	+16.8	186	216	252	265	330	290	70.2	65.5	86.9	66,640	78,812	84,470	183	216	231	+ 6.9
Texas Gulf	33,919	36,246	41,624	+14.8	1,094	1,169	1,343	1,117	1,227	1,310	97.9	95.4	102.5	363,252	424,619	437,245	995	1,163	1,198	+ 3.0
Louisiana Gulf	4,925	10,648	12,421	+16.7	159	344	401	172	321	352	92.4	107.2	113.9	54,300	121,215	139,883	149	332	383	+15.4
Ark., and La. Inland	2,613	1,933	2,456	+27.1	84	62	79	97	126	113	86.6	49.2	69.9	29,365	21,967	24,705	80	60	68	+13.3
Rocky Mountains	2,848	4,207	4,732	+12.5	92	136	153	137	178	183	67.2	76.4	83.6	33,570	48,044	52,254	92	131	143	+ 9.2
District No. 3	.....	332	323	— 2.7	.....	11	11	.....	13	13	.....	84.6	84.6	.....	4,034	3,770	.....	11	10	— 9.1
District No. 4	.....	3,875	4,409	+13.8	.....	125	142	.....	165	170	.....	75.8	83.5	.....	44,010	48,484	.....	120	133	+10.8
California	17,805	24,548	25,171	+ 2.5	574	792	812	787	994	1,013	72.9	79.6	80.2	213,133	284,938	300,250	584	781	823	+ 5.4
Total United States	124,985	148,171	165,037	+11.4	4,032	4,780	5,324	4,647	5,559	5,671	86.8	86.0	93.9	1,409,192	1,730,197	1,849,931	3,861	4,740	5,068	+ 6.9

Christmas Tree Valves



How to do it!

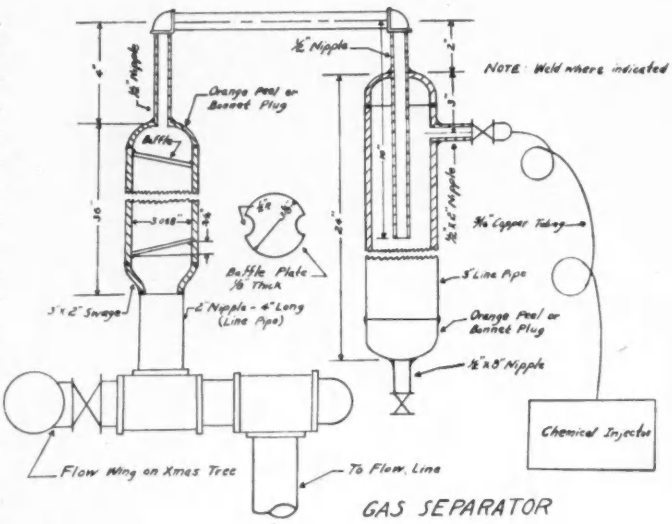
PRODUCTION HINTS



$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas

How To—Construct a Practical Gas Scrubber for Chemical Injector

Where chemical injectors are employed to add emulsion-breaking solutions to the flow stream from the well, and these injectors are powered by gas pressure, the accompanying diagram illustrates one practical method of constructing a gas scrubber to insure dry gas for the injector.



GAS SEPARATOR

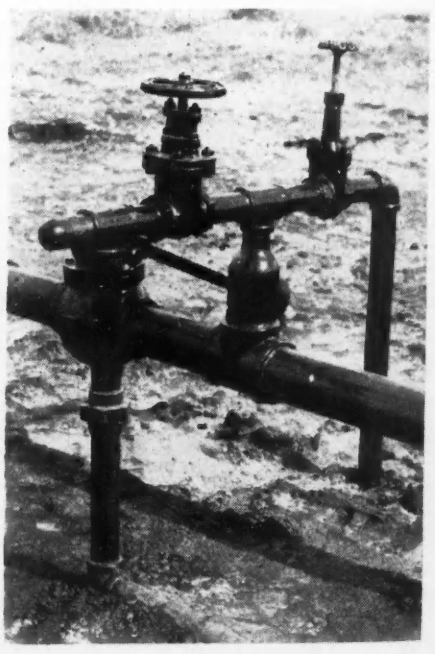
The scrubber consists of two vessels made from three-inch pipe with orange peel or bonnet plug ends. The first vessel, the primary separator, is connected to the flow line through a tee and short two-inch nipple. It is 36 inches long and contains two baffle plates welded inside the chamber at inclined angles. Two semi-circular openings in these baffles as illustrated permit the gas to pass through the separator. It is in this first chamber that most of the liquids are separated from the gas. Since the injectors take about 1000 cubic feet of gas per day, the rate of flow is relatively small.

The second chamber is connected to the first by half-inch pipe which extends into the vessel about eight inches, as shown. A half-inch outlet near the top of the chamber permits the gas to enter the chemical injector. A valve at this point controls the gas flow into the injector. Another valve located at the bottom of this second vessel makes it possible to drain any condensates collected.

The separator is attached to and takes gas from the flow wing at a point down stream from the well choke to avoid excessive pressure.

The gas scrubber may be made from scrap three-inch pipe, and is simple enough to be fabricated in the shop or on the job at a very low cost.

How To—Simplify Flow Line Tie-In



Valves on the lines from separator bottom and end of the well flow header are protected, expansion is compensated for, and control is simplified by the hook-up used by one producer. A tee is inserted into the meter run from the separator, just upstream from the check valve.

A swage and second tee provide a branched line for connections above the run, bringing the valve handles at a convenient height for manual control. The line shown at left in the photograph permits flow from the well flow header direct into the meter run, by-passing the separator.

The line at right, shown in open position, allows the separator base to be flowed into the run, taking fluid from the space which is used for water separation. Both branch flow lines are used only when it is not desired or possible to use the separator which, under normal operation, flows fluid through the meter run.

The method of tying in the lines introduces a swing effect which permits the length of the run to vary under expansion without stressing fittings or valves.

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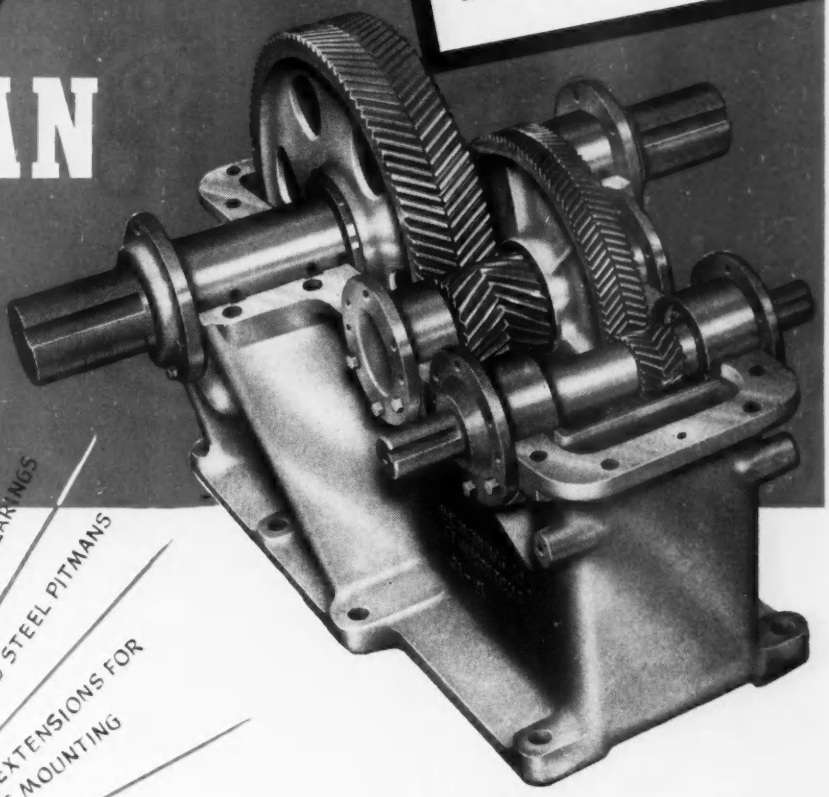

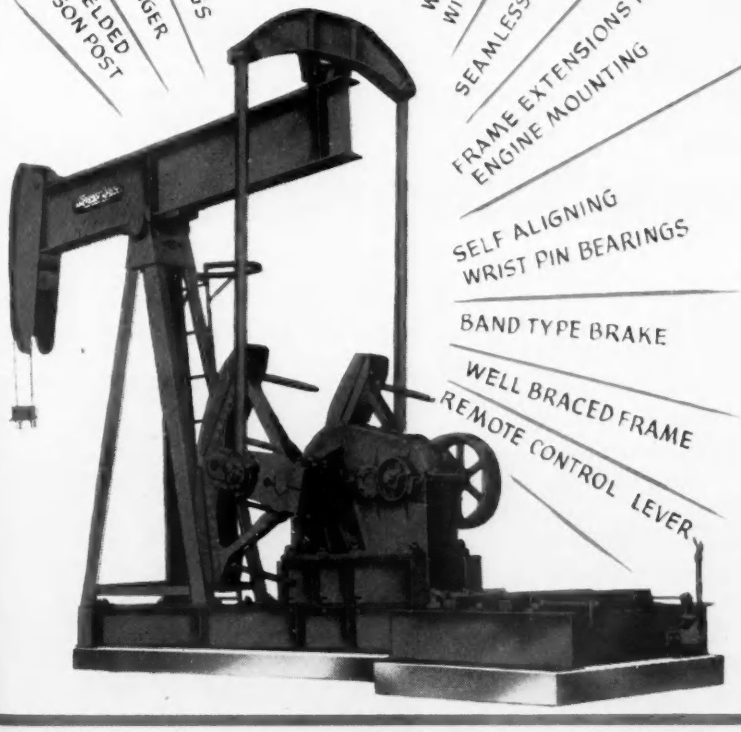

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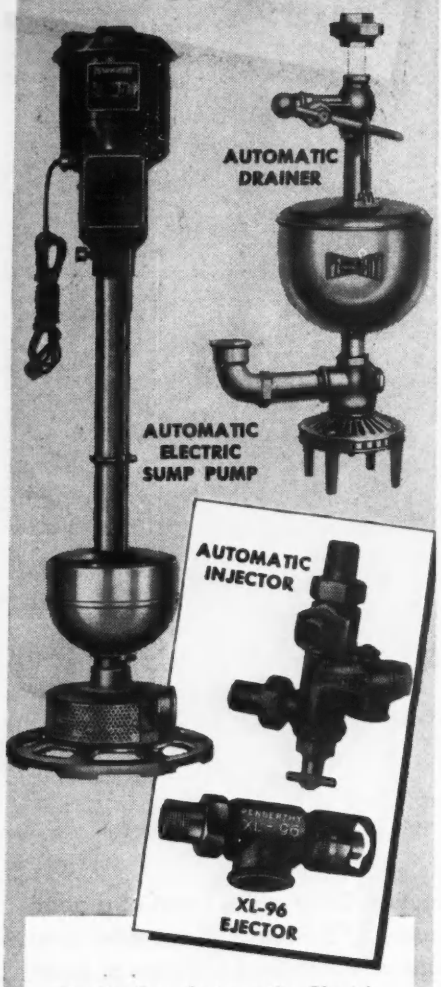

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Penberthy Ejectors use the power of steam, air or water under pressure to lift liquids. No moving parts—no lubrication. Also used as water heaters.

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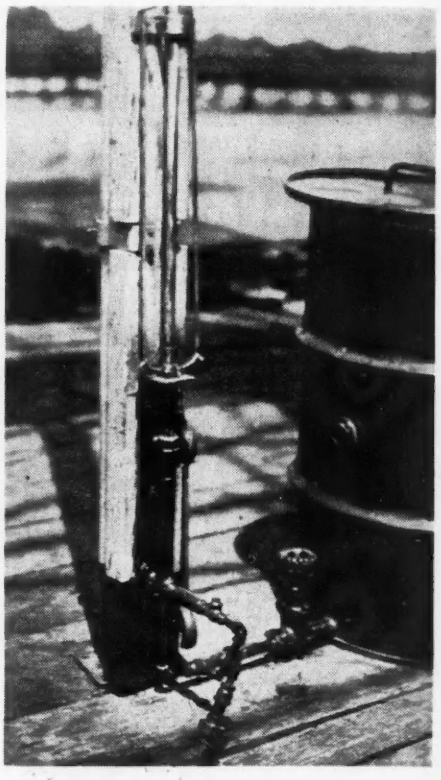
How To—Make a Temporary Chemical Injector

A temporary proportioning pump can be made by using pipe nipples, stuffing box with reducer and a double female fitting and a couple of check valves. The barrel of the pump is long enough to obtain the desired stroke of the plunger working inside which is fitted with leather cups arranged for suction and discharge to bring the chemical from the barrel supply and deliver it to the lead line.

The actuating plunger arm is extended up alongside a post to the walking beam where it terminated in a malleable cap for contact against the under side of the beam.

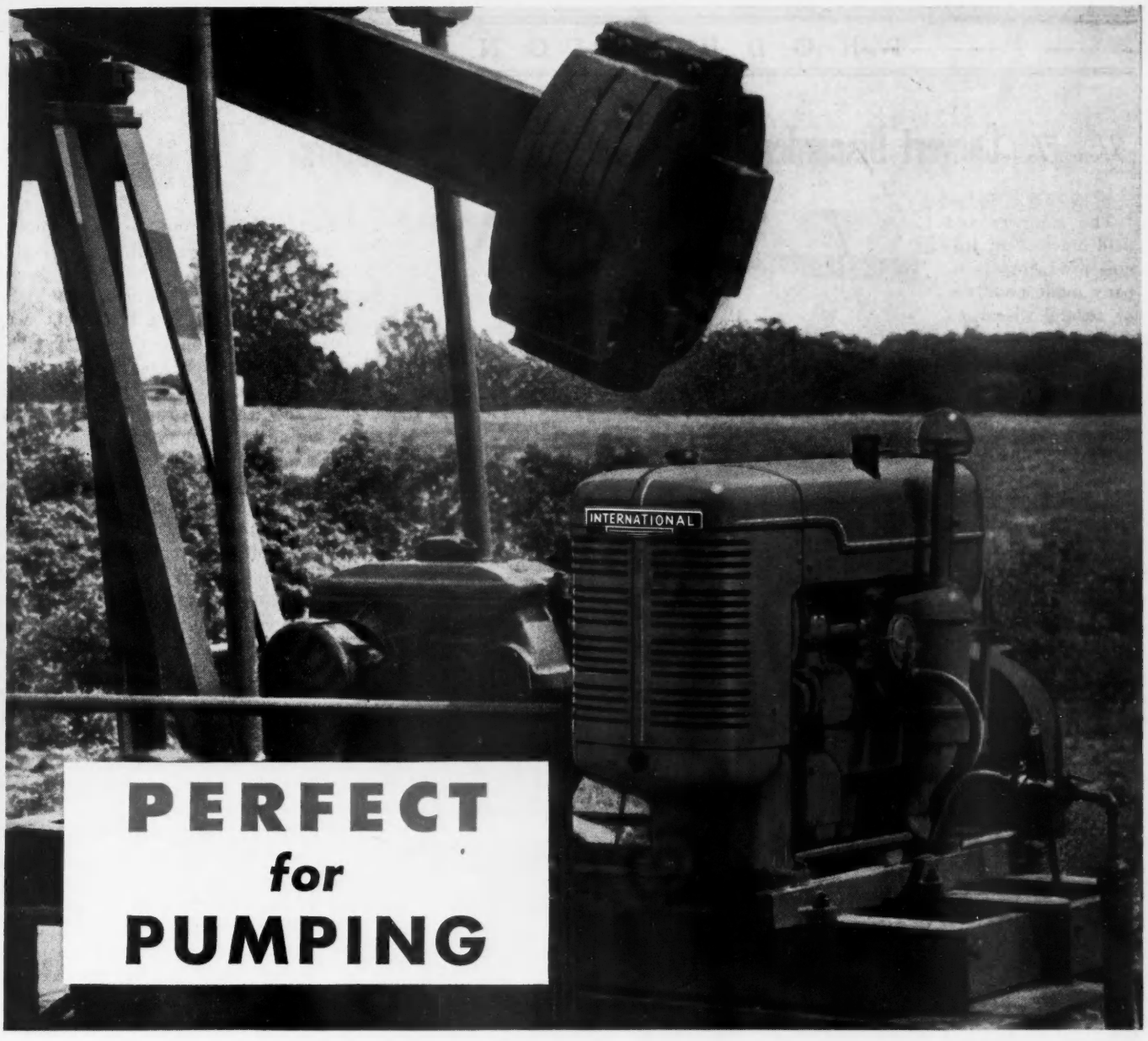
Small door springs attached to a bracket connected to the plunger arm at one end and to spikes in the timber where tension is desired brings the plunger arm up as the walking beam is lifted by the rotating crank and pitman. If the quantity of chemicals delivered by the pump is greater than required, it can be mixed with fluid to reduce the strength and thereby control the quantity of actual chemicals delivered.



How To—Support Oil Heater Lines

The two lines of a thermo-syphon circuit between settling tank and heating unit must be maintained on even slopes to prevent sags or humps which would choke or restrict flow. One producer devised an adjustable support which allowed setting of either line independently of the other. Two posts of two-inch pipe spaced 15 inches apart were set in a concerte base across the path to be followed by the pipe lines. Two supporting pads were threaded over the vertical pipes, one being set near the ground for the cold oil line. The other was placed high, to carry the hot oil to the tank.

The pads had collars at the ends, just large enough to slide over the two-inch uprights. In these collars were set screws which could be tightened against the pipe to give the proper slope. The two flow lines were laid on these pads, without being clamped. This allowed them to expand when heated without damage to fittings or supports.



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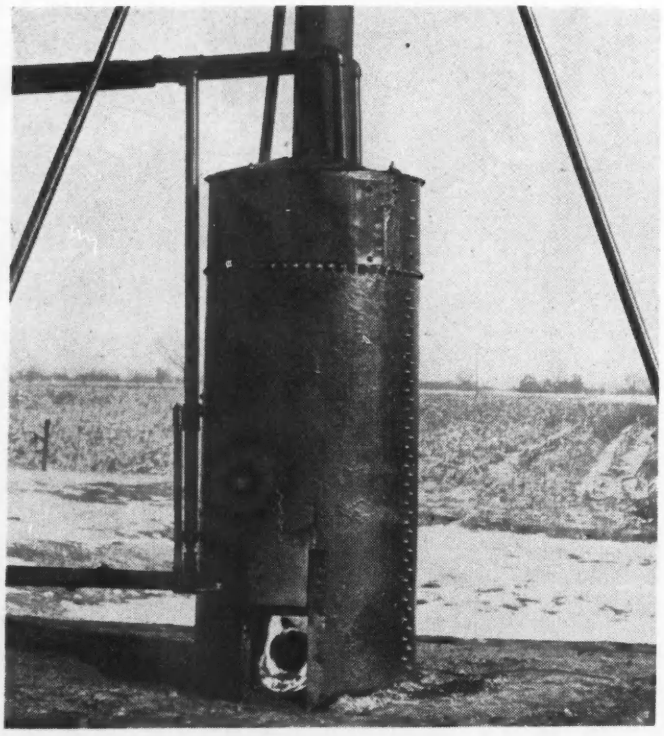
How To—Convert Discarded Oil Field Boilers into Oil Heaters

The engineer and field crew of an Illinois producing company made good use of several discarded oil field boilers by converting them into simple oil heaters. Each unit is equipped with two separate oil heating elements so that oil production entering two different tanks may be heated by this one heater.

Briefly, the unit consists of the outer shell of an old boiler that has been set on end and lined with fire brick. Pipe headers and tubes form the heating elements which are suspended inside the heater.



Fuel is supplied from the discharging oil.

A square concrete slab was poured to form a foundation for the boiler barrel. Fire brick were laid inside the boiler shell solid for the first lower ten inches except for a one-foot slot extending through the heater. This slot formed the fire box. The inside wall of the shell was then lined with one thickness of brick up to within one foot of the top.

Two heater elements made from three-inch header pieces and two-inch runners, were supported from the bottom and connected to the inlet (near the bottom) and the outlet . . . thus making four two-inch lines attached to the heater. This provides two inlet and two outlet lines.

The boiler dome was then placed on top of the brick lining and a 20-foot section of ten-inch casing set over the apex of the dome to act as a stack. It was supported by three legs made of two-inch pipe. Sand or clay was then filled in around the remaining 12 inches at the top and a tin covering provided to keep out water.

Oil for fuel was taken from the discharge line attached to the heater near its top. A one-inch line is taken from a tee and reduced to half-inch. Fuel feed is controlled by a pet cock in this line. A sliding door on the front and bottom of the outer shell may be used to control the draft.

The discharge lines go into a piece of eight-inch casing set in the production tanks. In this manner, the oil is carried to the bottom of the tank where the water may be separated out. This flume has four notches cut with a ripper about one inch up from bottom to permit the fluids to discharge into the tank.

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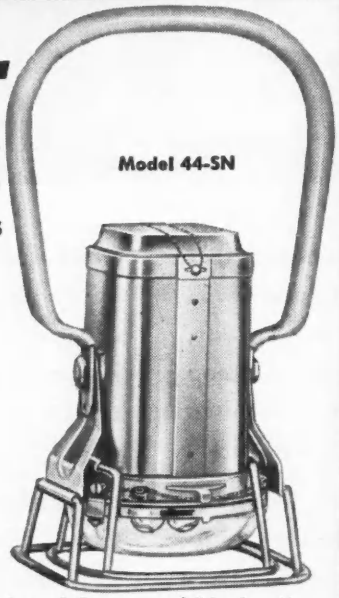
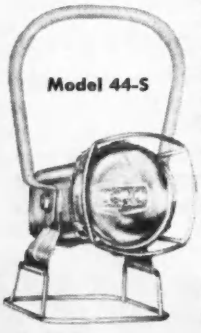


Model 44-S



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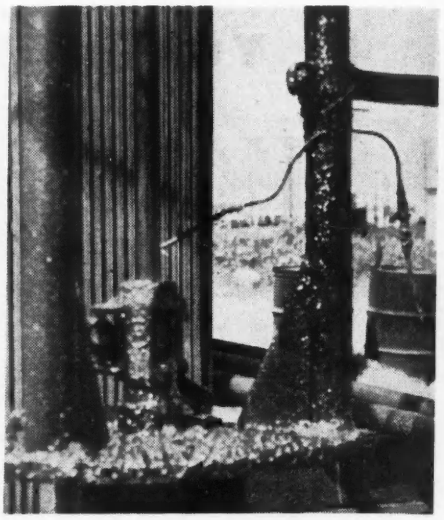
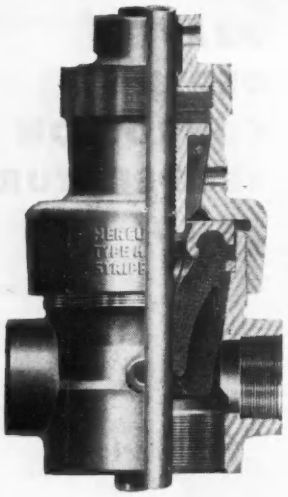
The water line was tapped and a tee inserted. From this tee, a ¾-inch water line brought the supply up to the well head. A reducer brought the size down to ¼ inch, and by means of an adapter, ¼-inch tubing was connected to the water line.

A pet cock was inserted in the copper tubing to control the flow of water. The tubing is flexible enough to be adjusted for any desirable position. The continuous stream of water pouring on the rod washes dust and grit that collects on the polish rod, and is considered as serving a useful purpose.



How To—Protect Copper Tubing Pressure Lines

The heater on the condensate flow line usually is controlled by a regulator, on one side of which is the high or field pressure. There is no flow through this line, which is generally small copper tubing. To provide a better method of attaching this line, a Carthage field operator welds a nipple into the high pressure line, about eight inches above the line. A second nipple is welded blind



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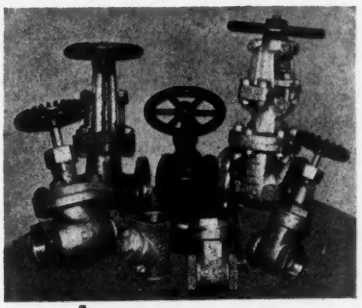

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AS OF DECEMBER 31, 1947

ASSETS		LIABILITIES		
Cash and Due from Banks	$ 95,775,980.99	Deposits		$337,362,820.30
U. S. Government Obligations	141,980,306.09	Acceptances		1,801,449.48
State, Municipal and Other Public Bonds	25,499,376.66	Dividend Payable January 2, 1948		84,000.00
Other Bonds and Securities	452,042.58	Reserve for Taxes and Accrued Interest and Expenses		1,040,302.21
Loans and Discounts	86,917,803.54	Other Liabilities		50,641.07
Bank Premises	3,046,240.33	Capital Stock	$2,800,000.00	
Other Real Estate	39,575.49	Surplus	9,200,000.00	
Customers' Liability Account of Acceptances	1,403,304.82	Undivided Profits	3,719,754.08	
Accrued Income Receivable and Other Assets	944,336.64			15,719,754.08
TOTAL	$356,058,967.14	TOTAL		$356,058,967.14

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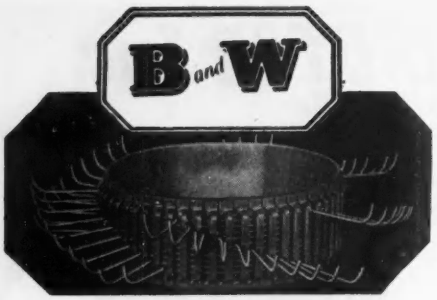

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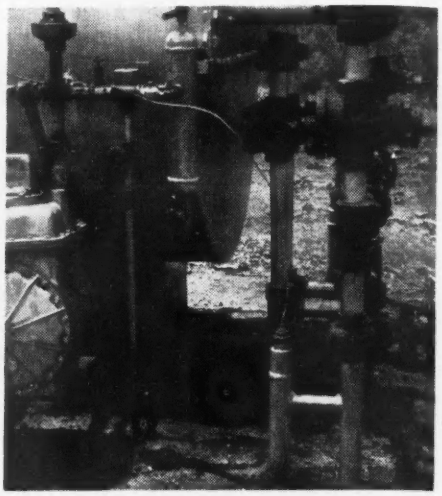
PRODUCTION HINTS

to the line, about the same distance underground. To these two nipples is welded a riser of two-inch pipe, with a drain cock at the base.

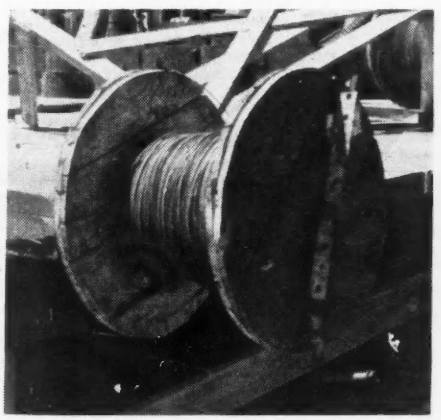
The pressure line connection is screwed into the top of this riser, and then carried over to the regulator. The riser acts as drip to prevent a slug of condensate from reaching the regulator diaphragm. The two nipples balance the force of the high pressure gas. The setting keeps the copper pipe guarded from accidental breakage. As there is no flow through the copper tube, the collection of condensate in the riser is very slow. On several installations the original drain cock has been replaced by a plug.



How To—Mount Sand Line Storage Reel on Tool Rack

Handling sand line at the loading dock, where service units unreel used line or take on new material, presents a problem in that reasonable care must be taken to assure that the line is wound neatly, yet speedily, to minimize lost time of both equipment and workmen. To assist in speeding up this operation, a length of two-inch pipe may be mounted horizontally at the edge of the loading rack or dock in the manner illustrated, and on which the spool may be installed.

On the outer side of the spool a hand crank is attached, the handle being lo-



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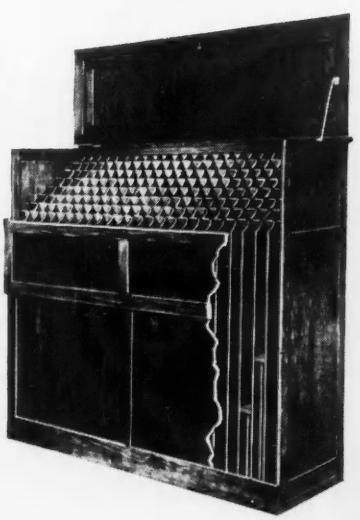

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cated near the periphery of the spool for easy turning when the spool is full of line. Because it is situated in a handy, centralized point in the yard, other tools or material may be loaded or unloaded at the same time wire line is handled. The spool may be removed easily if necessary, and represents negligible expense in rigging up.

How To—

Make Improved Anvil

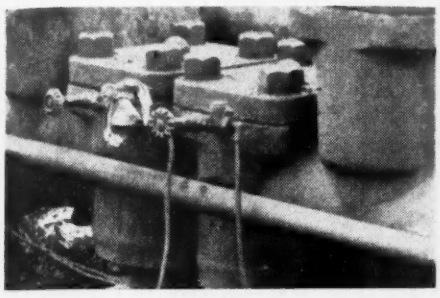
The lowly anvil still occupies an important part of the routine operations in the oil company maintenance shop, but because of the predominantly cylindrical and tubular work which is handled, a slightly different shaped anvil often is desirable. One company found that a salvaged cable tool spear or grab, modified in the manner shown makes a very handy anvil.

The only modifications necessary were to cut off one leg of the spear and turn off the threads to give a long gradual taper. The unit is set up on a concrete-filled length of oil well casing set in the ground and there welded in place. The long tapered thread end of the tool may be used for shaping many sizes of tubular goods, the center section used for hammering the heavier work, and the long tapered leg and tip being ideal for smaller jobs. The improved tool requires little time to set up once the threads are turned off and its handy features will more than pay for the cost of the installation.

PRODUCTION HINTS

How To—

Bleed Waste Water Pump



On pumps which handle large quantities of waste water, they are frequently left to themselves until the pits have been emptied of fluid. Air is sometimes drawn into the cylinders to form pockets and air-lock upon starting again.

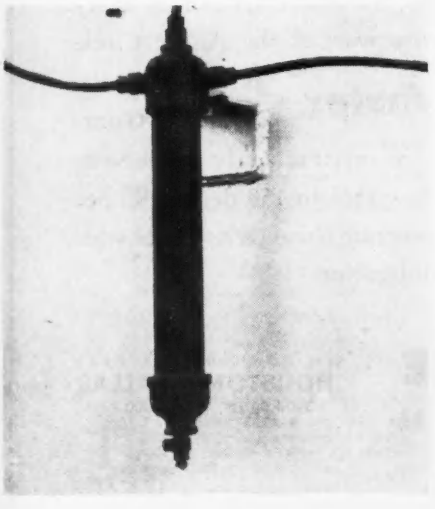
By drilling eight-inch holes for pipe taps, connections are attached with control valves and checks so the attendant can open the cocks and forget them until everything is running properly. Copper lines lead the discharge to a common header back to the pit to prevent adding to the slush common to such settings.

The check valves are important, because they prevent intake of air on the suction stroke, but allow air and fluid to escape on the discharge stroke. Connections are placed on both chambers at each side of the pump, and located at a convenient place for the pumper to operate.

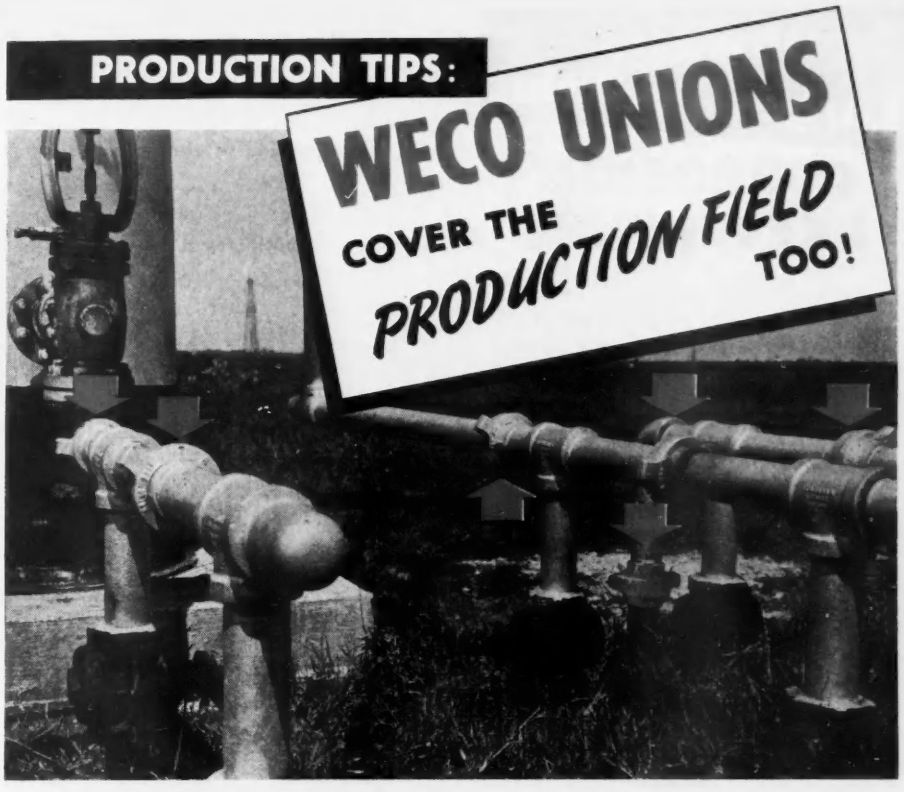
How To—

Clean Regulator Gas

Pressure of the gas flowing from the separator is used on many leases to control the flow of fuel to the heater



PRODUCTION TIPS:



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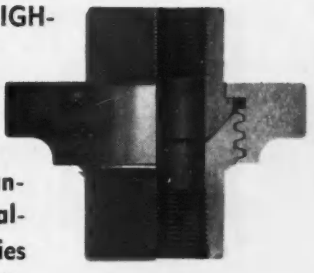

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in the emulsion breaker, as well as to regulate admission of the stream to the separator.

One producer uses a single pressure line tap for both regulators. The line is brought to a convenient point on the separator shell, where a trap, formed from a 12-inch length of two-inch pipe, is mounted. The upper cap is tapped in the center for pressure inlet, and on opposite sides for leads to the two regulators. The cap at the bottom is fitted with cock for draining off any condensation which may collect.

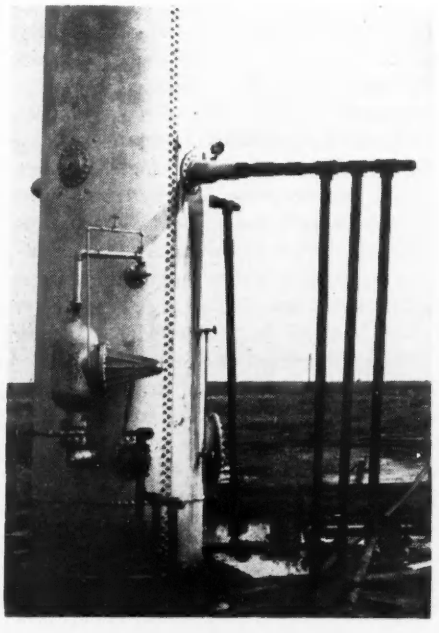
The drip trap, in addition to catching condensate which otherwise might reach and damage the regulators, also serves as surge chamber to dampen out fluctuations in gas outflow from the separator. This provision makes for smoother operation of the regulators and better heating and flow conditions both in emulsion breaker and separator.

How To—Reduce Stress in Separator Manifold

When flow lines from several wells must be laid on top of the ground to minimize corrosion, expansion changes in length are much greater than when the lines are buried.

One producing company brings in the lines from the various wells on blocking above ground level to avoid saline soil and brine, fitting each with an elbow at the separator site. The flow lines are then brought up vertically to a series of tees in the horizontal flow line into the separator. Excessive expansion in any one line is absorbed by the long riser, or by shift in the alignment of its tee with regard to the others. The motion is reversed as the line cools.

The three risers, each on a line tending away from the others, act to support the horizontal run, and thus absorb strain on the separator flange.



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10,000 Miles of Pipe Line Construction Probable in 1948

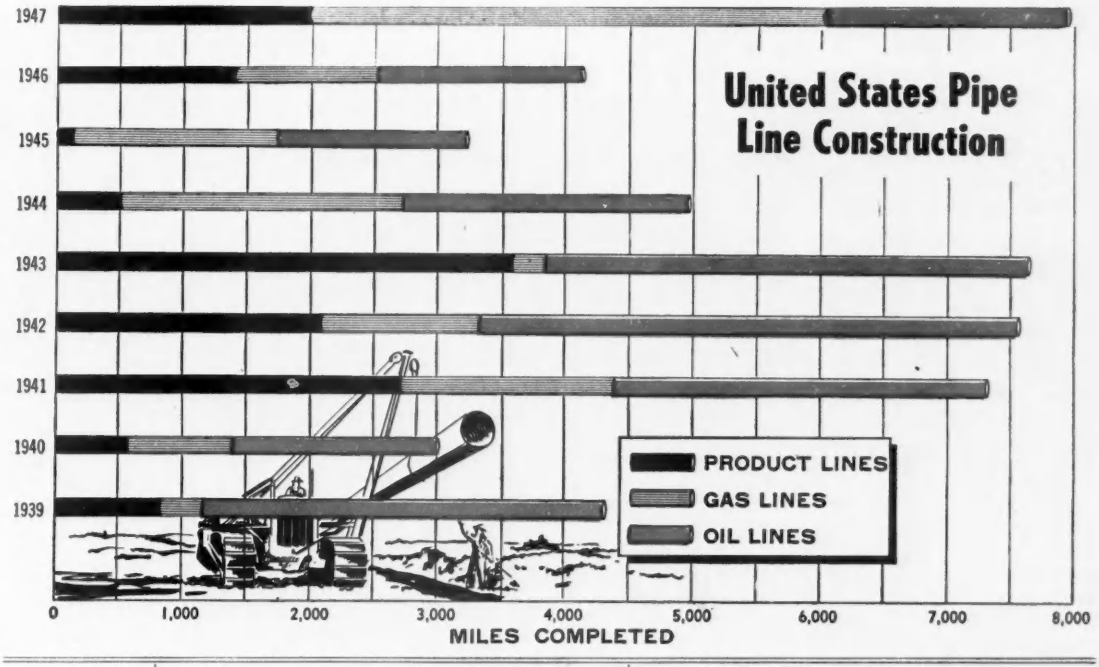
By MARY E. POOLE
Staff Writer

THE number of miles of new pipe line placed in operation in the U. S. during 1947 totaled 7953, a gain of 85 percent over 1946 construction, and this precedent-shattering figure is likely to be further surpassed in 1948, during which time it is expected that about 10,000 miles of new line will be completed.

At the end of 1947, approximately 5257 miles of lines were under construction and 8534 miles were authorized, totaling 13,891 miles. A further indication of great expansion in the country's pipe line systems is the estimated 16,625 miles of lines under consideration by companies or not yet approved by the Federal Power Commission. Most of these projects will not materialize before 1950, because pipe cannot be obtained. The problem of pipe supplies is not only delaying major construction plans but has continued during the past year to slow down and stop construction on many lines. Companies have displayed a good deal of ingenuity in getting pipe to lay and are making economical use of reclaimed pipe.

Natural Gas Lines

More than half the lines completed during 1947 were gas; 3555 such lines were being constructed and 6235 were authorized at the end of the year; and of



YEAR	MILES OF NEW PIPE LINE PLACED IN OPERATION[1]				MILES OF LINE BUILDING OR AUTHORIZED AT YEAR END[2]			
	Oil	Product	Gas	Total	Oil	Product	Gas	Total
1947	1876	2598	3479	7953	2715	1386	9790	13891
1946	1610	1404	1271	4285	2099	2638	4771	9508
1945	1470	143	1598	3211	831	882	248	1961
1944	2219	518	2224	4961	112	....	286	398
1943	3795	3614	262	7671	848	....	1423	2371
1942	4200	2100	1250	7550	1147	428	140	1715
1941	2900	2700	1700	7300	322	....	446	768
1940	1615	575	810	3000	457	450	243	1150
1939	3155	840	305	4300	460	589	171	1220

[1] These figures represent total length of new systems actually placed in operation during the year. [2] Mileage on all types of pipe line systems on which construction was still under way at end of year, plus mileage of new lines authorized. Natural gas lines include system authorized by Federal Power Commission, but not applications on which Federal Power Commission has not yet acted.

the 16,625 miles of all lines under consideration, 13,759 miles are gas. Several large projects were completed or got under way in a real attempt to move abundant gas supplies from Texas, Oklahoma, Kansas and Louisiana into northern and eastern industrial areas. Denver got a relieving supply of Hugoton gas. The "Biggest Inch" by late December began taking Texas Panhandle gas into Los Angeles, as California became an importer. California, whose reserves went lavishly into the recent war in the Pacific, may also become an importer of West Texas crude if plans now being considered by Shell interests are defined in 1948. The Appalachian and the New York area got some additional gas and expected more as Texas Eastern Transmission Corporation purchased and converted the Big and Little Inch oil lines to gas transmission lines. Connecting companies in the Southeast States, Great Lakes and Atlantic Coast areas based immediate plans to expand their systems on TET's increased ability to supply them. Tennessee Gas Transmission Company made very good progress on a program to vastly increase capacity, both by looping and adding compressor stations along the line. If FPC approves its recent application to extend its line into New York, Boston and Pittsburgh, gas supply in the East would no longer be as uncertain as now.

Despite increased facilities for transportation of gas and products, serious shortages in early 1948 revealed the necessity of bringing more supplies into the New York and Detroit areas. Numerous plants have closed intermittently because of the short supply of fuel, with first consideration going to home heating. Michigan-Wisconsin Pipe Line Company, now constructing a line to take 325 million cubic feet of gas daily from the Texas Panhandle to Detroit, does not expect to complete construction before April, 1950.

FPC estimated in December that an additional 1,310,000,000,000 cubic feet of gas would be carried by interstate lines if all proposed projects were completed.

Products lines completed during 1947 totaled 2598 miles, more than in any year except 1943 and 1941, though only 878 miles were being built, 508 miles were authorized and 235 miles were known to be under consideration.

Great Lakes Pipe Line Company completed station and terminal work during 1947 and now has an 1100-mile products system in operation throughout the Midwest. Standard Oil Company of Indiana's system from its Whiting, Ind., refinery was extended into Minnesota; Socony-Vacuum Oil Company extended its carrier from the Paulsboro, N. J., refinery to Midland, Penn.; Sinclair Refining Company completed a system in Ohio and part of Michigan which may some day extend to Texas. Concentration of construction of products lines at the end of the year was in Texas, where two systems from the Gulf Coast and Southwest areas will complete in 1948 to carry products into Dallas-Fort Worth terminals and later into Midwest carriers. Phillips Petroleum Company was not able to complete its line to transport Borger refined products to Denver, and is stopped at La Junta, Colo., until more pipe is available.

There was less emphasis on crude line construction during 1947, though major lines were authorized and several were being considered. Increased crude line capacity was obtained by extensive and well-planned looping programs.

During the year, 1876 crude lines were completed, 824 miles were being laid and 1891 miles were authorized. Under consideration were an estimated 2631 miles of crude lines to be involved in long-range projects, such as a big-inch carrier from Midland, West Texas, to Wilmington, Calif. Several companies are planning outlets for the ever-increasing Permian Basin production of West Texas and New Mexico, and the Rangely field, Colorado.

Pipe Line Activity in 1947

Alabama

Atmore, (City of) completed 20 miles 6-inch transmission, 20 miles distribution lines connecting to United Gas Pipe Line Company. System designed and constructed by Ray R. Littrell, Opelousas, La.

Arizona

El Paso Natural Gas Company received FPC authorization for approximately 83 miles of 4½-16-inch line, and additional facilities. Construction scheduled February, 1948 on 5 miles 4½-inch from main line to Tucson City Gate Station 2, and 20 miles 8-inch from main line to Phoenix. Construction by company crews.

El Paso Natural Gas Company completed 17-mile 6-inch loop on 8-inch line serving Morenci.

El Paso Natural Gas Company is constructing 20 miles of 8⅝-inch gas line from 26-inch main line to Phoenix. Scheduled to complete February, 1948.

Arkansas

Arkansas Louisiana Gas Company completed 21 miles 12¾-inch, 4½ miles 8⅝-inch gas lines as additions to "L System," including two 8⅝-inch lines across Arkansas River.

Arkansas Western Gas Company completed 11 miles 8-inch gas line near Cass Mountain, Franklin County. Worth James Construction Company, contractor.

Interstate Oil Pipe Line Company completed 8½ miles of 6 and 7-inch crude outlet for Spirit Lake and Miller fields to main trunk line near Mandeville station.

California

General Petroleum Corporation completed 5 miles of 8-inch products line from Torrance refinery to Edison Company, Redondo Beach. Hood Construction Company, Lynwood, Calif., contractor.

Pacific Gas & Electric Company completed 2 2/5-miles 20-inch, 3 miles 16-inch gas line from Rosedale-Greeley field, San Joaquin Valley. Pacific Pipeline & Engineers, Ltd., Los Angeles, contractor.

Pacific Gas & Electric Company was completing 22 miles 20- and 24-inch gas line from Sunnyvale to Redwood City. Pacific Pipeline & Engineers, Ltd., Los Angeles, contractor.

Pacific Public Service Company completed early in 1947 approximately 35 miles, including laterals, 4-12-inch line from Suisun Bay, Kirby Hills, Cache Slough, and West Rio Vista gas fields to Standard Pacific's connection at Pittsburgh. About 3 miles of water crossings were involved. Pacific Pipeline Construction Company, contractor.

Signal Oil & Gas Company awarded contract for 3½ miles of 22-inch gas line from Long Beach to Signal Hill to Pacific Pipeline & Engineers, Ltd., Los Angeles.

Southern California Gas Company and Southern Counties Gas Company completed 214-mile, 30-inch sector of the "Biggest Inch" gas line, from connection with the El Paso section at Blythe to Los Angeles. Complete line runs to New Mexico and North Texas.

Southern California Gas Company completed 10 miles of 10-inch and 7½ miles of 6-inch from Trico and Delano, and was completing 18 miles of 8-inch line from there to Tipton, 15 miles of 6-inch line from there to Porterville. The lines will add 26 million cubic feet of gas daily to the San Joaquin Valley area, will be used jointly with Pacific Gas & Electric Company.

Southern California Gas Company proposed construction of an 8-inch line from the "Biggest Inch" line at Desert Center south to Calexico, about 68 miles of line.

Standard Oil Company of California started construction of 6 miles of 3-inch butane line from the refinery to Buena Park. Hood Construction Company, contractor.

Colorado

The California Company is planning a 180-mile, 10-inch line carrying 22,000 barrels of crude per day from Rangely field to Salt Lake City. Construction will start in spring of 1948; scheduled completion, July, 1948.

Cheyenne Light, Fuel & Power Company constructed 11 miles of its proposed Denver-Cheyenne 16-inch gas line for use as storage. Construction could not be completed for lack of pipe.

Colorado-Wyoming Gas Company awarded contract for a 120-mile, 8-inch gas line from Denver to Cheyenne to Pacific Pipeline & Engineers, Ltd., Los Angeles. Only 85 miles remained to be laid in January, 1948. Line ties into Colorado Interstate's Hugoton, Kans.-Denver gas line completed October, 1947.

Standard Oil Company of California will award contract in March, 1948, for a 160-mile, 10-inch line to carry 25,000 barrels of crude from Rangely field to Salt Lake City. Scheduled completion date in 1949. Line will be operated by Salt Lake Pipe Line Company.

Stanolind Pipe Line Company's 1946 proposed line, 120 miles 12-inch from Rangely field to Wamsutter, Wyo., paralleling existing 10-inch line of Utah Oil Refining Company, subsidiary of Standard Oil Company (Indiana), remained in abeyance during 1947. Nothing announced for 1948. Plans included extension from Wamsutter to Casper, Wyo. Line would carry 25,000 barrels of crude per day.

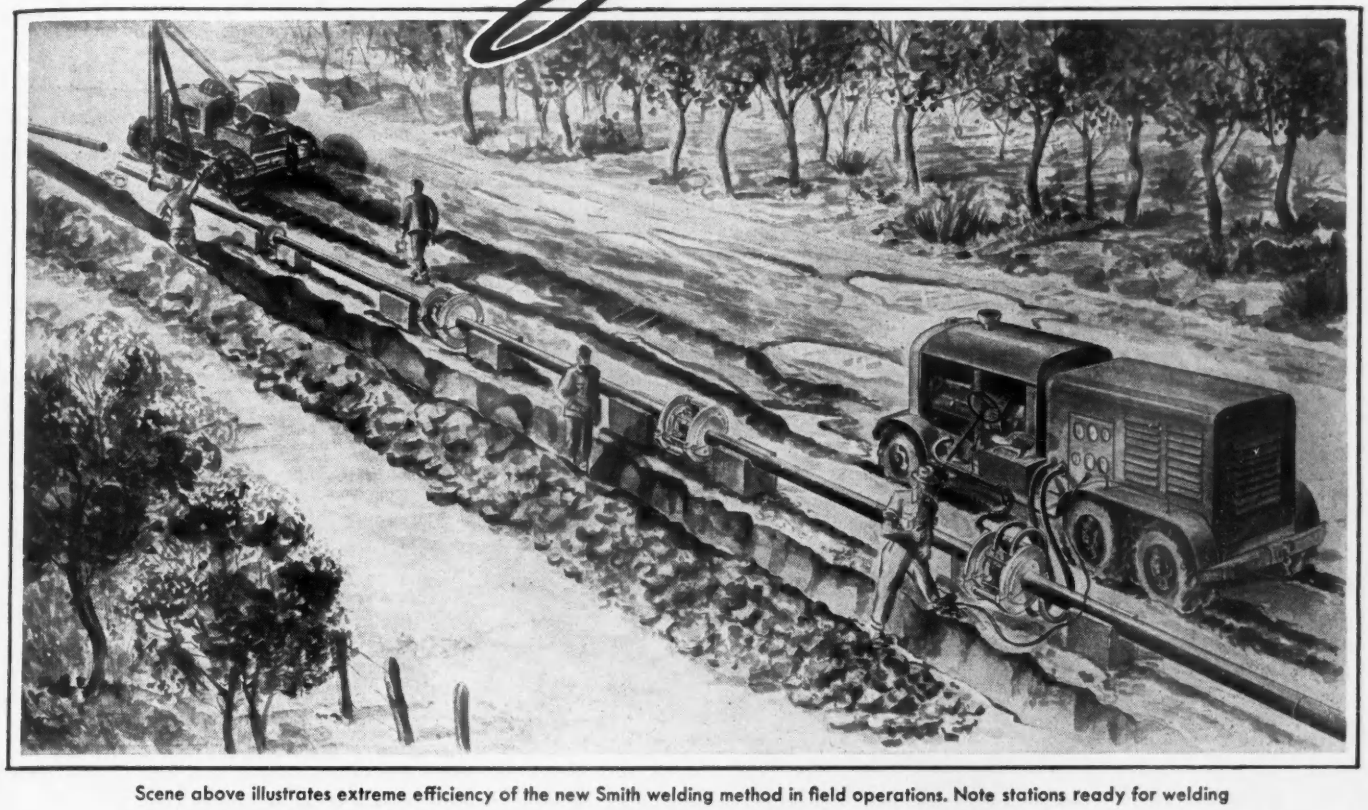
Superior Oil Company of California completed 60 miles of 8-inch gas line from Douglas Creek field to Grand Junction.

Utah Oil Refining Company has dropped its plan to construct in 1948 a crude carrier from Rangely field to Salt Lake City refineries.

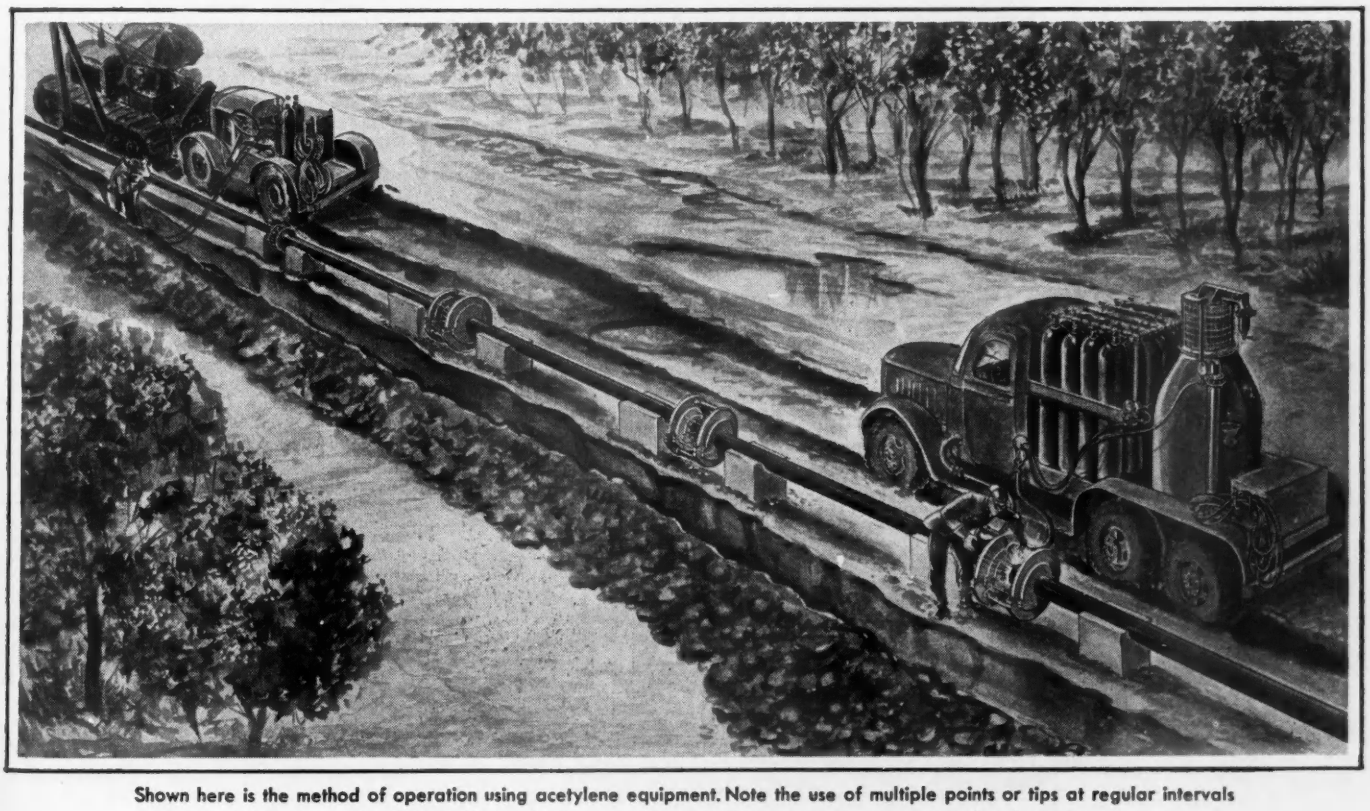
Connecticut

Connecticut Pipe Line Corporation plans to construct a 40-mile, 8-inch products line from New Haven to Hartford, only such line wholly within the state. Capacity approximately 19,000 barrels daily. Scheduled completion date, end of 1948.

welding costs!



Scene above illustrates extreme efficiency of the new Smith welding method in field operations. Note stations ready for welding in advance of welding unit. Cuts crew size and time on the job.



Shown here is the method of operation using acetylene equipment. Note the use of multiple points or tips at regular intervals around the joint to be welded. Smith Hydraulic Pressure Alignment Clamps assure an accurate well-formed weld.

Illinois

Central Illinois Public Service Company completed 1 mile of 4-inch gas line near Havana, 5½ miles of 6-inch gas line near Mattoon. S. H. Hobbs Construction Company, Lawrenceville, Ill., contractor.

Chicago District Pipe Line Company completed 11-mile, 24-inch loope on its Crawford-Chicago gas line, increasing deliveries to Chicago 95 million cubic feet daily.

Chicago District Pipe Line Company completed 19 miles of 24-inch gas line between Joliet and Chicago. Midwestern Constructors, Inc., Tulsa, contractor.

Gulf Refining Company, Tulsa Pipe Line Division was completing 48 miles of 10-inch lines, 5 loops, between Centralia and Dublin, Ind., making 2 complete 10-inch lines between these points. Sheehan Pipe Line Construction Company, Tulsa, T. & L. Construction Company, Centralia, contractors.

Western United Gas & Electric Company completed 5 miles of 8-inch and 9 miles of 12-inch gas line between McHenry meter station and Crystal Lake, south of Downers Grove. Midwestern Contractors, Chicago, contractor.

Indiana

Anchor Hocking Glass Corporation planned 10 miles of 6-inch gas line between Winchester and Ripley, W. Va., for completion February, 1948. Construction by Midwestern Constructors, Inc., Tulsa. Job includes takeup of 7 miles of 6-inch gas line.

Eastern Indiana Gas Company completed laying 6½ miles of new 4-inch line, 1½ miles of used 4-inch line, and took up 3½ miles of 4-inch near New Castle. S. H. Hobbs Construction Company, Lawrenceville, Ill., contractor.

Indiana Gas and Water Company completed 5½ miles of 8-inch, 2-7/10 miles of 6-inch, and approximately 1 mile of 4-inch gas lines near Lafayette. S. H. Hobbs Construction Company, contractor.

Standard Oil Company (Indiana) completed its 662-mile 8 and 10-inch products line from the company's Whiting refinery to Moorehead, Minn., via Minneapolis and St. Paul. Stanolind Pipe Line Company acted as agent in construction.

Iowa

Great Lakes Pipe Line Company awarded contract to take up and recondition 120 miles of 6-inch products lines between Oceola and Council Bluffs to A. C. Holder Construction Company, Tulsa.

Kansas

Cities Service Gas Company plans to start a 389-mile, 26-inch gas line from Hugoton field to Kansas City, completing 61 percent by end of 1948 at a convenient point on system, finish in 1949. Housing and compressor station construction under way. Estimated capacity of line, 267 million cubic feet.

Cities Service Gas Company proposes to replace 44 miles of 16-inch line with 20-inch.

Cities Service Gas Company obtained FPC authorization to construct 32 miles of 20-inch line from North Welda to Ottawa station.

Colorado-Interstate Gas Company completed its gas carrier from Hugoton field to Denver. Project included 240 miles of 20-inch, 20 miles of 20-inch bypass around Denver, 140 miles of 4½-20-inch gathering system, compressor station at Lakin. Capacity: 100 million daily. J. R. Horrigan Construction Company, Houston, Contractor.

Colorado Interstate Gas Company prepared to start 30 miles of 4-16-inch gas gathering system near Ulysses, Grant County, Kansas. J. E. Cheek Construction Company, Pampa, Texas, contractor, Completion scheduled in April.

Hope Natural Gas Company has application before FPC to construct a 1128-mile 22-inch gas carrier from the Hugeton field to Kanawha County, W. Va., and laterals and compressor stations.

A. R. Jones Oil & Operating Company completed 11 miles of 10¾-inch line from its new compressor station 2 miles south of Great Bend to Northern Natural Gas Company's sweetening plant 2 miles northeast of Albert. A gathering system in Barton, Pawnee and Rush counties also completed.

Kansas-Nebraska Natural Gas Company completed 56 miles of 16-inch and 21 miles of 12¾-inch gas lines from Phillipsburg to Hastings, Neb., with approximately 100 miles of lateral lines to serve Nebraska communities.

Kansas-Nebraska Natural Gas Company completed 8½ miles of 6-inch gathering lines in Pawnee County. R & G Pipeline & Construction Company, Russell, Kansas, contractor.

Kansas-Nebraska Natural Gas Company applied to FPC for authorization to loop part of the Scott City-Stockton-Phillipsburg and Otis-Plainsville lines.

Magnolia Petroleum Company prepared to begin construction on gas gathering system in Hugoton field. Lines from 4 counties in western Kansas to deliver to plant to be constructed 2 miles east of Hickok starting mid-1948. R. H. Fulton & Company, Lubbock, Texas, to lay 5 miles of 24-inch, 19 miles of 20-inch, 3 miles of 18-inch, 2 miles of 16-inch, 6 miles of 12¾-inch, 7½ miles of 10¾-inch, 12½ miles of 8⅝-inch, 23½ miles of 6-inch, 56½ miles of 4½-inch. Company will award contract for 7½ miles of 16-inch, 5¾ miles of 8⅝-inch, 52 miles of 4½-inch later in year.

Mid-Continent Gas Transmission Company awaited FPC authorization for 400 miles of 26-inch gas line from Liberal to Kansas City, 438 miles of 26-inch from there to St. Paul, plus 3 compressor stations.

Northern Natural Gas Company is looping its main line north of Clifton in Nebraska, Iowa and Minnesota, involving 35 miles of 16-inch transmission, 150 miles of 18-24-inch loops, and construction of 6 compressor stations, increasing capacity of system 82 million cubic feet daily. Eastern Construction Company, Dallas, and McVean &

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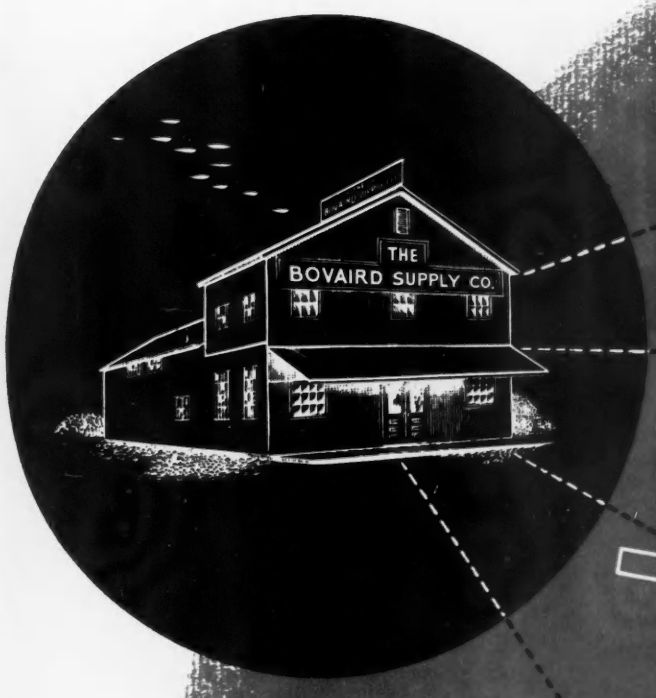

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Roberts Pipe Line Construction, Odessa, Texas, completed some loops.

Northern Natural Gas Company is waiting on FPC authorization for 320-mile, 26-inch loop from Garden City station to Palmyra, Neb.; 245-mile, 24-inch loop from Palmyra to Farmington, Minn.; 17-3/10-mile, 20-inch loop from Palmyra to Saunders County, Neb., giving system increase of 173 million cubic feet of gas per day.

Phillips Petroleum Company completed 3½ miles of 3-inch, 9 miles of 8-inch extension lines in Butler, Greenwood and Coffey counties. Vaughn & Taylor, Wichita Falls, Texas, contractor.

Sinclair Refining Company completed 50 miles of 18-inch loop on its trunk system near Iola. O. C. Whitaker Company, Fort Worth, contractor.

Skelly Oil Company completed 45 miles of 8-inch line, 15 miles east of Hutchinson, 30 miles near McPherson. H. V. Knupp Construction Company, Great Bend, Kansas, and M. E. White Construction Company, McPherson, contractors.

Skelly Oil Company completed 10 miles of 4-inch crude line from Boggs pool, Barber County, to Sohio gathering line in northwestern part of county.

Socony-Vacuum Oil Company is preparing to construct 7 miles of crude line from the Adel pool, Sheridan County, to Morel pool, Graham County.

Kentucky

Central Kentucky Natural Gas Company received FPC authorization late in 1947 for 23 1/5 miles of 24-inch line from Foster to connection on Ohio River with Cincinnati Gas and Electric Company's line, and for a new metering station.

Commonwealth Natural Gas Corporation has an application before FPC to build 537-mile 20-inch gas line, capacity 100 million cubic feet per day, from connection with TGT near West Bend to Norfolk, Va., and laterals to Roanoke, Petersburg, Richmond and Suffolk, Va.

United Natural Gas Company was ready to start on a 23-mile, 24-inch loop on main line between Alexandria and Foster. Contract awarded to Williams Brothers, Tulsa. Scheduled completion date, February 15.

Louisiana

Anchor Gasoline Corporation completed a 35-mile line carrying 10 million cubic feet of gas from wells at Church Point area to Eola processing plant.

Arkansas-Louisiana Gas Company completed 9 miles of 10-inch gas line, capacity 18 million cubic feet daily, from Ada gas field, Webster Parish, to company's trunk line.

Continental Oil Company completed a 50-mile, 14-inch line from Tepetate field to Westlake and the alkali plant at Lake Charles. Eastern Construction Company, Dallas, contractor.

Interstate Oil Pipe Line Company completed laying 8 miles of 12-inch lines along Morganza Floodway, Pointe Coupee Parish. Also completed were two 8-inch lines replacing six 8-inch lines on Moore to Anchorage trunk system.

Interstate Oil Pipe Line Company completed 12½-mile, 4-inch line from Bayou Mallet, east of Baton Rouge, to the Sunset Roanoke line. Townsend Brothers Construction Company, Bunkie, La., contractor.

Mississippi River Fuel Corporation was completing 265 miles of 22-inch loops, 14 miles of 12-inch loops on the Monroe-St. Louis natural gas carrier. Looping program mainly in Arkansas, Louisiana and Missouri with line from St. Genevieve to East St. Louis. Increases system's capacity by 50 million cubic feet. Holland Construction Company, Tulsa; Ford Bacon & Davis, New York, contractors.

Mississippi River Fuel Corporation was given FPC authorization to proceed with a 231-mile looping program from Perryville, La., to St. Louis, increasing system's capacity by 83 million cubic feet daily. Lines will connect existing and authorized sections parallel to 22-inch main line, resulting in 2 separate main lines. Program includes 199 miles of 22-inch, 2 3/10 miles of 12-inch for stream crossings, 30 miles of 10-inch line.

Pelican Oil Purchasers completed 20 miles of 6-inch crude line near Jennings. Latex Construction Company, Houston, contractor.

Root Petroleum Company completed 26 miles of 6-inch crude line from Ora field to El Dorado, Ark., refinery. Snelling Company, Shreveport, La., contractor.

The Texas Production Company began late December a 14-mile 8-inch gas line from Lake Salvador and Delta Farms to Lafitte plant, near Harvey. Associated Contractors & Engineers, Houston, contractor.

United Gas Pipe Line Company completed a 24-mile, 12-inch gas trunk line from Barataria, Delta Farms, Bayou Perot and Stella fields to New Orleans, with a capacity of 65 million cubic feet daily. Project also included three 10-inch Mississippi River crossings, 3300 feet each. B & M Construction Company, Oklahoma City, contractor.

United Gas Pipe Line Company completed a 16-mile, 12-inch gas line from Hayes field, Calcasieu Parish, to the Iowa compressor station. Project includes 1 mile 4-inch gathering lines and 2 well meter stations.

United Gas Pipe Line Company started late December construction of 4 3/5 miles 7-inch, 9 miles of 8-inch gas line from West Lake Verret field, St. Martin Parish, to Oaklawn Plantation. Brown & Root, Inc., Houston, contractor.

Maine

Portland Pipe Line Company proposed construction of a 20-inch light crude carrier from Portland to East Montreal, Canada, with pipe for construction not anticipated before 1950. Company would construct 166 miles to International Boundary; Montreal Pipe Line Company, Ltd., remaining 70 miles in Canada. Line, paralleling present carrier, to carry approximately 60,000 barrels daily. Work on existing 8 pump stations in 1947 increased capacity of present 12-inch line 10,000 barrels. Further station work planned to obtain another 10,000-barrel addition to capacity.

Socony-Vacuum Oil Corporation announced plans for a 11,500-barrel products line from S. Portland terminal to Bangor, via Hallowell, near Augusta. Line will be constructed of 61 miles 6-inch, 66 miles 4-inch. Construction may begin in spring, 1948.

Maryland

Cumberland & Allegheny Gas Company has FPC authorization to construct 2 1/5 miles

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of 6-inch gas line from the Pennsylvania border to Allegany County connection.

Michigan

Austin Field Pipe Line Company is constructing 162 miles of 24-inch gas line, 42 miles of 10 and 6-inch laterals from the Austin storage field, Mecosta County, to Detroit. The project ties into the Michigan-Wisconsin Pipe Line Company 1181-mile line from Texas Panhandle, and will transport 325 million cubic feet daily. One 7200-hp station being built on line. J. R. Horrigan Construction Company, Houston, contractor. To be completed by summer, 1948.

Austin Field Pipe Line Company authorized to construct 140 miles of 26-inch gas line from the Austin field to Detroit, a metering station at the Detroit terminus, a compressor station at the Austin field, which Michigan Consolidated Gas Company will lease and operate.

Austin Field Pipe Line Company has FPC approval to construct 8 miles of lines in the Austin storage field, 9½ miles of lines in the Reed City gas storage field. It will take gas from Michigan-Wisconsin Pipe Line Company lines now under construction.

Campbell, Wyatt & Cannon Foundry Company completed a 31 mile, 6-inch gas line from Kimball Lake field, Newaygo County, to Muskegon. Anderson Brothers Corporation, Houston, contractor.

Dow Chemical Company completed 29 miles of 6-inch gas line from Headquarters field to Loomis. Somerville Construction Company, Ada, Mich., contractor.

Michigan Consolidated Gas Company received FPC authorization to construct approximately 17 miles of 24-inch line from Evergreen, eastern terminus of the Austin-Detroit line to Melvindale.

Michigan Gas Storage Company has authority to construct 150 miles of 24-inch from Chelsea terminal of Panhandle Eastern Pipe Line Company to Winterfield and Cranberry Lake gas storage fields.

Panhandle Eastern Pipe Line Company completed 70 miles of 16-inch gas lateral from Allen Park to west bank of Detroit River to connect with 2 parallel 12-inch lines under river to International Boundary.

Panhandle Eastern Pipe Line Company completed a gas gathering system in Howell field, including 8 miles of 8-inch, 8 miles of 10-inch, 2 miles of 6-inch, and 7 miles of 4½-inch. Company also completed 19 miles of 10-inch transmission from the field to its trunk line, carrying 10-15 million cubic feet of gas per day.

Simrall Corporation completed 42 miles of 6- and 4-inch crude line from Reed City to Newaygo. E. J. Mahoney Contracting Company, Mt. Pleasant, Mich., contractor.

Sun Oil Company completed a gas gathering system in Kimball Lake field, Newaygo County: 12 miles of 4-inch, 4 miles of 6-inch. Somerville Construction Company, Ada, Mich., contractor.

Mississippi

Atlantic Gulf Gas Corporation has application before FPC for 1530-mile, 26-inch gas system from Hattiesburg to Georgetown, S. C., and Jackson, Fla. Gas to be purchased from United Gas Corporation.

Interstate Oil Pipe Line Company completed 17½ miles of 10-inch crude loop between Cranfield to Liberty station, increasing system's capacity by 10,000 barrels a day. Associated Contractors & Engineers, Houston, contractor. Another 17½ miles of 10-inch completed loop between the two points in late 1947. Latex Construction Company, Houston, contractor.

Interstate Oil Pipe Line Company completed 10 miles of 6-inch crude line from Cranfield to LaGrange, 8 miles of 4-inch pipe to the Carthage Point field. Associated Contractors & Engineers, Houston, contractor.

Southern Natural Gas Company completed 80 miles of 16-inch gas line from Gwinville field to Pickens, connecting to main line. Latex Construction Company, Houston, contractor.

Southern Natural Gas Company authorized to construct facilities for is main gas transmission line. Latex Construction Company, Houston, completed 18½ miles of 20-22-inch loops, near Birmingham. Other 1947 construction authorized: 9 miles of 6 5/8-inch loop paralleling Meridian branch line, 6½ miles of 6⅝-inch loop paralleling the Columbus-West Point branch line. The 1947-48 construction authorized by FPC consists of 130 miles of 24-20-inch main line loops, 33 miles of 12¾-inch loop on the Gadsden, Ala., branch line, extensions to Lexington, and to White Plains, Ala., connecting with a 165-mile extension to Jacksonville, Fla., a 155-mile main line connection for Tallassee, Ala. Approval to construct a line to Chattanooga, Tenn., and various towns in northern Alabama, has not been given by FPC.

United Gas Pipe Line Company completed an 85 mile, 6-inch line from Jackson station to Philadelphia, Neshoba County.

United Gas Pipe Line Company applied for permission to construct 93 miles of 18-inch gas line from Baxterville field, Marion County, to Mobile, Ala., to install 8½ miles of 16-inch pipe as replacement for smaller line between Mobile and Pensacola, Fla., and to loop a tap line from main line to Florida Pulp and Paper Company, near Cantonmen.

United Gas Pipe Line Company completed a 34-mile, 6-inch gas line from the Gwinville field to the McComb lateral line.

United Gas Pipe Line Company completed a gas gathering system for the Baxterville field, Lamar County, and a 10¾-mile, 12-inch line, extending west to its present system with connection at Boagalusa. The company also constructed a gathering system in the Gwinville field.

Nebraska

Kansas-Nebraska Natural Gas Company was awaiting FPC approval for construction of 47 miles connecting line between Cambridge and Coazad.

Kansas-Nebraska Natural Gas Company asked for FPC permission to replace a line between Holdrege and Elm Creek with larger pipe, and to extend the line from Elm Creek 35 miles north.

New Jersey

Socony-Vacuum Oil Company completed a 350-mile, 12-10-8-inch products system from Paulsboro to Malvern, Penn., Lancaster, and Midland. The line is designed for westward movement only. O. C. Whitaker Company, contractor.

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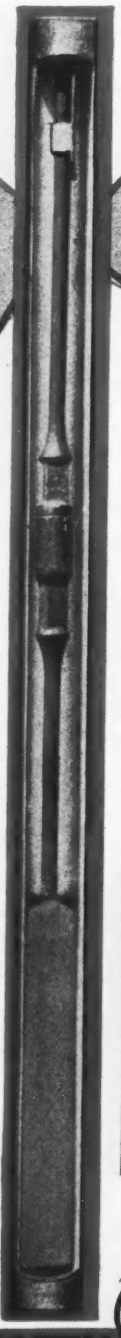

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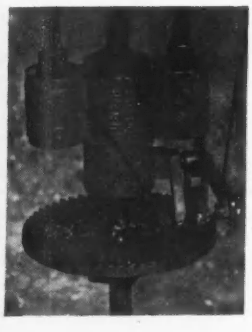

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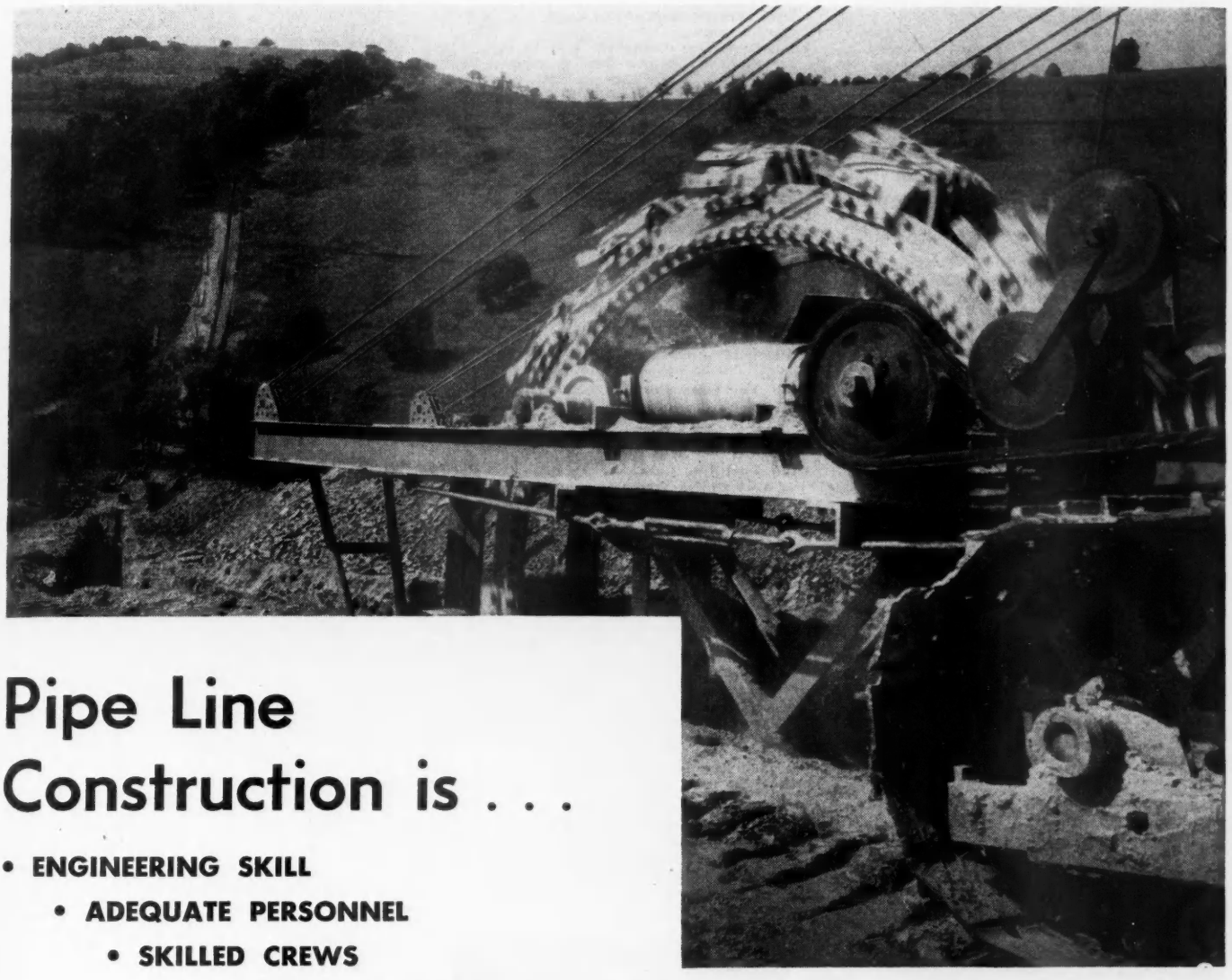

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New Mexico

El Paso Natural Gas Company completed 737 miles of 26-inch from Eunice to Blythe, Calif., where it connects with Southern Counties Gas Company and Southern California Gas Company's 30-inch line into Los Angeles. A lateral from Dumas, Texas, to Eunice completes the line. Capacity, 125 million daily.

El Paso Natural Gas Company proposes to loop the New Mexico-California line with 438 miles of 26-inch, adding 100 million cubic feet of gas per day to system, from point in Lea County to Colorado River, near Blythe. Construction is not contemplated before 1950 or 1951.

El Paso Natural Gas Company proposes to add a second line to California, 470 miles of 25-inch from San Juan Basin to Needles, Calif., carrying 100 million cubic feet daily. Construction not contemplated before 1951.

El Paso Natural Gas Company completed a 46½-mile, 16-inch line from its Jal 1 plant to the 26-inch line in Eddy County.

Maljamar Repressuring Company is constructing approximately 15 miles of various-sized gas gathering lines in the Maljamar field. McVean & Roberts Pipe Line Construction Company, Odessa, Texas., to complete January, 1948.

Phillips Petroleum Company completed a 35-mile gas gathering system of 4-6-8-10-16-20-inch pipe at Eunice.

The Texas Pipe Line Company, Shell Pipe Line Corporation, Empire Pipe Line Company, Sinclair Pipe Line Company (Basin Pipe Line System) are constructing a 500-mile project from Jal to Cushing, Okla., with Latex Construction Company, Houston, handling the 253-mile, 22-inch spread from Midland to Wichita Falls, Texas. The line will carry normally 150-200,000 barrels of crude daily. Contract has not been awarded on the 173-mile, 24-inch sector between Wichita Falls, and Cushing. The 67-mile, 20-inch section from Jal to Midland has been awarded to Morrison Brothers Construction Company, Odessa. Line will connect with Ozark Pipe Line System from Cushing to Wood River, Ill., to be built by Texas and Shell.

New York

Home Gas Company has application with FPC to build 26 2/5 miles of 12-inch gas line between Hancock and Cohocton, 25 miles of 10-inch line between Horsesheads and the Dundee storage field, and other facilities.

Penn-York Natural Gas Corporation was waiting on FPC approval to build a 65-mile, 10- and 14-inch line from Yark to Lewiston on the Niagara River, with 1200-hp compressor station, to export 15 million cubic feet of gas daily to Dominion Natural Gas Company, Ltd., Ontario, Canada.

Ohio

East Ohio Gas Company completed 50 miles of 20-inch gas line between Jackson storage area, Stark County, and main line in Cleveland suburbs.

East Ohio Gas Company will start in 1948 an 84-mile, 20-inch line between Mullet Farm and Ross Farm stations to take Big Inch gas into system.

Ohio Fuel Gas Company completed a 47-mile, 16-inch line between Treat station, Licking County, and Crawford station, Fairfield County. This part of the 88 miles of 16-inch lines being laid in Lorain, Fairfield, Licking and Knox counties was constructed by Midwestern Constructors, Tulsa.

Ohio Fuel Gas Company has FPC approval for 22 miles of 16-inch between Brown and Pavonia station, via Monroe station, Knox and Richland counties, and for enlarging underground storage facilities at Perrysville field.

Ohio Fuel Gas Company has authorization for a 90-mile, 20-inch line between Burlington and Crawford station, Lawrence and Fairfield counties. Midwestern Constructors, Tulsa, has contract.

Ohio Fuel Gas Company has completed 2½ miles of 20-inch Ohio River crossing, from point near Steubenville to West Virginia station. Midwestern Constructors, Tulsa, contractor.

Ohio Fuel Gas Company started in late 1947 a mile of 4-6-8-inch gathering line in Lorraine, field and 2½ miles of 10-inch near Parma, just south of Cleveland. Midwestern Constructors, Tulsa, contractor.

Sinclair Refining Company completed extension of its refined products system: 56 miles of 6-inch line from Toledo to Detroit; 118 miles of 6-inch from Toledo to Columbus via Marion; 225 miles of 6-inch from Marion to Cleveland, Akron and Youngstown. Anderson Brothers Corporation, Houston, contractor.

Transit & Storage Company proposes to lay a 152-mile crude carrier from Cygnet to the International Boundary in Michigan, to connect to Imperial Oil, Ltd.'s lines to Sarnia, Ontario, refinery. The 16-inch line, with 1 pumping station, will replace one 8-inch and two 6-inch lines, and 4 stations now in use.

Oklahoma

Central Pipe Line Company completed a 2-mile, 3-inch crude outlet for the Munger field to a connection with Standish Pipe Line Company's line.

Cities Service Gas Company completed a cross-over line, from Mulhall, near Guthrie on the Wichita-Oklahoma City line, west side of system, to Drumright station on east side of system: 15 miles of 16-inch, 32 miles of 12-inch capacity, 32 million cubic feet. Permian Basin Construction Company, Odessa, Texas, and Al Johnson Construction Company, Oklahoma City, contractors.

Cities Service Gas Company completed an outlet for the Witcher field to its main line: 2 miles of 10-inch, ½ mile of 6-inch, capacity, 25 million cubic feet. Western States Construction Company, Oklahoma City, contractor.

Cities Service Gas Company completed a connection in Grady County to Consolidated Gas Utilities Corporation's line: 10½ miles of 16-inch. Capacity, 90 million cubic feet. Albert Johnson Construction Company, contractor.

Cities Service Gas Company completed the replacement of 19 miles of 12-inch line between Tallant and Hogshooter with 15½ miles of 16-inch pipe. Capacity of line now 62 million cubic feet. Permian Basin Construction Company, contractor.

Cities Service Gas Company was completing a gathering system near Guymon, Texas County, including 7 miles of 22-inch, 11 miles of 12-inch, 7 miles of 10-8-6-4-inch pipe. Carlson & Son Construction Company, Pampa, Texas, constructor.

Empire Pipeline Company completed a crude gathering system in the Lindsay field, McClain and Garvin counties, 13 miles of 6-inch, with 6- and 4-inch laterals.

Interstate Oil Pipe Line Company was completing 47 miles of 12-inch line connecting its Oklahoma City pump station with the Katie-Maysville area, Garvin County. Midwestern Constructors, Tulsa, contractor.

Lone Star Gas Company completed a 21-mile, 10-inch gas outlet from the Cumberland field, Marshall County, to intercept its North Texas line at Denison, Texas.

Mid-Continent Pipe Line Company completed 47 miles of 6-inch and 14 miles of 4-inch connecting line from the St. Louis pool to Elmore City, carrying 7500 barrels of crude. Capacity to be increased to 12,500. C. P. Carter Construction Company, Seminole, Okla., contractor.

Mid-Continent Pipe Line Company is starting a 17-mile, 4-inch line from South Canadian River to Fitts station, carrying 6600 barrels of crude. A. C. Holder Construction Company, Tulsa, contractor.

Natural Gas Pipeline Company of America completed an extensive 26-inch looping program on its Oklahoma-Joliet, Ill., system. R. H. Fulton, contractor, completed 46 4/5 miles from Station 2, Oklahoma Panhandle, to south end of old 26-inch loop, in Kansas except for Cimarron River crossing. J. R. Horrigan Construction Company, Houston, completed 66 1/5 miles from north end of old loop, near Garfield, to south end of old loop, near Wilson; also 69 4/5 miles from North end of old loop, near Haddam, to south end of old loop near Unadilla, Neb. Ray L. Smith & Son, El Dorado, Kans., completed 69 4/5 miles from east end of old loop near Orient, Iowa, to point 34 7/10 miles east of Station 8 in Iowa. C. S. Foreman Company, Kansas City, completed 1 4/5 miles double 20-inch Des Moines River crossing; also 40 2/5 miles loop from east end old loop near Ardon, Iowa, to point near Crampton, Ill. Has not completed 19 4/5 miles of two 22-inch lines for Mississippi River crossing. Midwestern Constructors, Tulsa, completed 52 miles of 24-inch loop from point near LaSalle, Ill., to Joliet station, delivering to Chicago District Pipe Line Company.

Natural Gas Pipeline Company of America has authorization for 13½ miles of 26-inch loop between Station 8 in Iowa and Des Moines River, 13 7/10 miles of 26-inch from Crampton to Station 10 in Illinois, 54 1/5 miles 24-inch from Station 10 to point near La Salle, and has awarded contract for 36 4/5 miles 26-inch Station 1 near Hooker, Okla., to point near Oklahoma-Kansas border to R. H. Fulton & Company.

Oklahoma Natural Gas Company has completed 7½ miles of 8-inch line connecting Witcher field with main line to southeast. Western States Construction Company, Oklahoma City, contractor.

Oklahoma Natural Gas Company completed 12 miles of 12 ¾-inch line from Peppers Gasoline Plant, West Edmond field, to connection with main line. Western States Construction Company, contractor.

Oklahoma Natural Gas Company removed 19 miles of 16-inch pipe on its system. Western States Construction Company, contractor.

Shell Pipe Line Corporation and The Texas Pipe Line Company (Ozark Pipe Line System) may get under way in fall of 1948,

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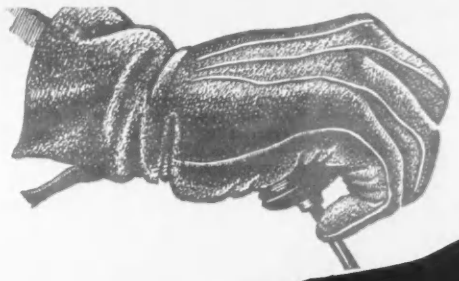
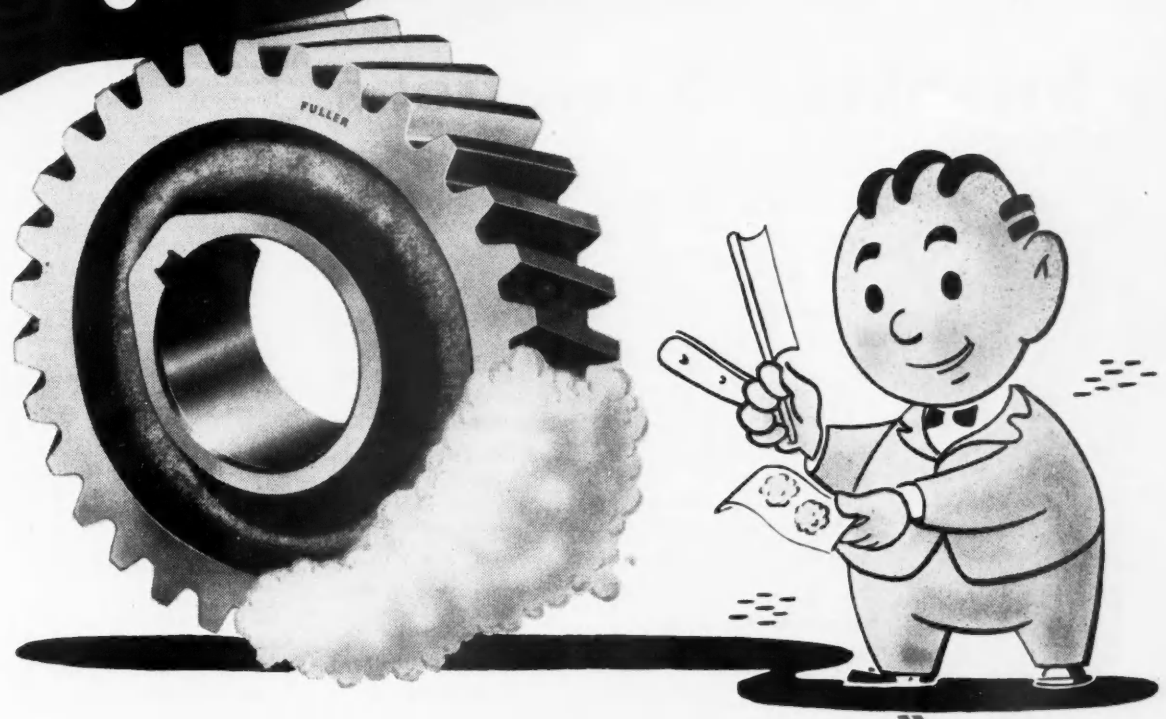


Once Over Lightly . . .



The gear teeth in Fuller Transmissions and Auxiliaries receive a "close shave" in the Fuller factory . . . a process which assures a finer finish and closer tolerances. Such painstaking control of production standards is important to you because carefully mated gears mean a transmission that is quiet from the start.

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TRANSMISSIONS

with scheduled completion in 1949. System consists of 378 miles of 20-inch, 61 miles of 16-inch, from Cushing to Wood River, Ill., refinery, to Salem, Ill. It connects at Cushing to the Basin Pipe Line System from Jal, N. M., bringing approximately 150,000-200,000 barrels of crude out of the Permian Basin.

Skelly Oil Company completed 30 miles of 2-6-inch crude system near Velma, feeding into Interstate Oil Pipe Line at Tussy. J. Carlson & Son, Pampa, Texas, contractor.

Skelly Oil Company plans to lay 9 miles of 6-inch, continuing present crude gathering system near Velma.

Stanolind Pipe Line Company completed most of its 1947 looping program on Drumright-Whiting, Ind., system. Midwestern Constructors, Tulsa, finished 178 miles of 20-inch from Drumright to Freeman, Mo., meeting loop laid in 1946; 262 miles between La Plata, Mo., and Manhattan, Ill., almost completed by O. C. Whitaker Company, Fort Worth. Completion gives continuous 20- and 22-inch carriers from Oklahoma to Indiana refinery, increases capacity by 42,000 barrels products daily.

Sunray Oil Corporation completed 12 miles of 4-inch from the Albright pool to Holdenville.

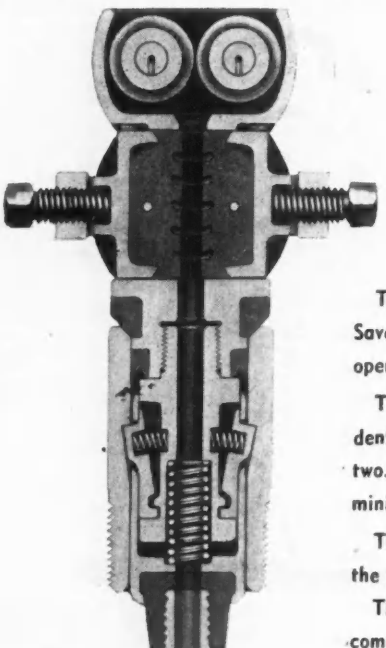
Sunray Oil Corporation completed 83 miles of 8-inch products line from the Allen refinery to Drumright terminal, connecting to Great Lakes Pipe Line Company. Approximate capacity: 30,000 barrels daily. Wilcox Oil & Gas Company has interest in last 16 miles.

Sunray Oil Corporation completed 94 miles of 6-inch products line from the Allen refinery to Duncan refinery via Velma, carrying 20,000 barrels daily. Pipe Line Service Company, Seminole, Okla., contractor.

Sunray Oil Corporation completed a 17-mile, 6-inch crude line from Velma field to Duncan refinery at Beckett, and is extending the line 79 miles to Allen refinery from Velma. Capacity, 20,000 barrels. Pipe Line Service Company, contractor.

Sunray Oil Corporation will construct a 17 mile, 8-inch crude line from The Texas Company's Velma station to Duncan refinery, carrying 25,000 barrels a day.

For Swabbing Operations



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TYPE 3AR AUTOMATIC RELEASE WIRE LINE STRIPPER

Type 3AR King Wire Line Stripper (often called "Oil Saver") is the ideal tool to use in connection with swabbing operations.

The positive latch and sure release insure against accidents and eliminate the possibility of jerking a wire line in two. The non-sparking materials used in its construction, minimize the fire hazard.

The packing is inserted from the sides of the tool and the tool can be repacked while the line is in the hole.

The roller line guides center the line and outlast the more commonly used bushing many times. Grease nipples are provided to lubricate the guide rollers. Convenient hand holds contribute to easy handling of the tool. *This tool is constantly coming into greater use.* A trial is convincing.

FOR WIRE LINE CORING
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The Type 4AR Stripper is similar to the Type 3AR, except it is a little larger. It is commonly used in connection with the Type 4C King Circulating Head. It can be, and sometimes is used with other makes of circulating heads.

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See 1948 Composite Catalog (Pages 2129 to 2140) for detailed description of other King Tools.

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HOUSTON 10, TEXAS

The Texas Company is constructing 23 miles of 8-inch crude line from Antioch pool, Garvin County, to Velma, Stephens County, C. L. Rogers Construction Company, Wichita Falls, Texas, contractor.

Warren Petroleum Corporation was preparing to construct 64 miles of 2-30-inch gathering system in the Antioch pool. Holland Construction Company, contractor.

Warren Petroleum Company is planning to lay approximately 200 miles of gas and products lines 2-30-inch from the Garvin-McClain area to gasoline plant under construction at Mayesville.

Pennsylvania

Manufacturers Light & Heat Company completed 54 miles of 20-inch gas line from a TGT connection at West Virginia-Pennsylvania state line to Pittsburgh. Capacity: 84 million cubic feet daily.

Manufacturers Light & Heat Company, is constructing 130 miles 14-inch gas line from Coatsville to Port Jervis, N. Y. Williams Brothers, Tulsa, contractor.

Manufacturers Light & Heat Company has been authorized to construct 3 1/5 miles of 20-inch line near Groveton, Allegheny County.

Manufacturers Light & Heat Company proposes construction of 7½ miles of 14-inch line to various connection points with TGT.

New York State Natural Gas Corporation has been authorized to construct 1 1/10 miles 20-inch connecting line to TGT, in Greene County.

New York State Natural Gas Corporation has authority to costruct 70 miles of 12¾-inch, 50 miles of 14-inch loops, and 14 miles of 16-inch transmission lines in 1947; also 59 miles of loops in 1948.

United Natural Gas Company was completing 72 miles 20-inch extension from Beaver County to TGT connection in Greene County. Williams Brothers Corporation, Tulsa, contractor.

United Natural Gas Company completed 16 miles of gas line between Lamont and Lewis Run.

South Dakota

Socony-Vacuum Oil Company proposes to build 235 miles of 6-inch products line between Sioux Falls and Fargo, N. D.

Tennessee

Alabama-Tennessee Natural Gas Company has applied to FPC for permission to build 66 miles of 10-inch extension from its lines to Muscle Shoals, Ala.

Alabama-Tennessee Natural Gas Company filed an application late in 1947 with FPC to construct 75 miles of 12¾-inch line from TGT connection near Middleton to Tuscumbia, Ala., a 35-mile, 8⅝-inch extension from there to Decatur, a 26-mile 6⅝-inch extension from there to Huntsville.

East Tennessee Natural Gas Lines obtained preliminary FPC approval to construct 186 miles of 16-inch, 112 miles of 12¾-inch lines from TGT connection near Nashville to Chattanooga, from there to Knoxville; plus 150 miles of 3-8-inch laterals. Contract has been awarded N. A. Saigh Company, San Antonio.

Mid-East Tennessee Natural Gas Company has applied to FPC for permission to lay 106-mile trunk line from Southern Natural Gas Company's proposed facilities near Chattanooga to Knoxville.

East Texas

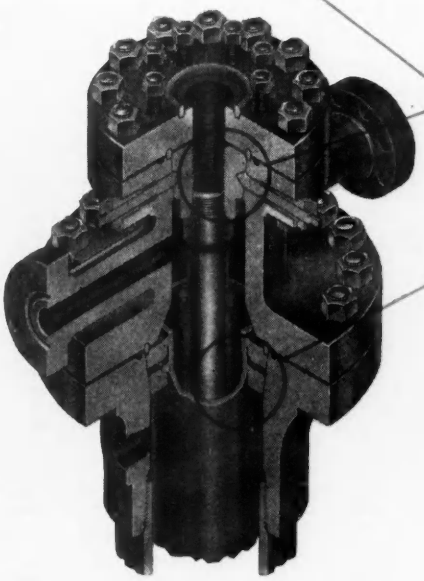
Humble Pipe Line Company completed 43 miles of 6-inch crude line from Longview terminal to Pittsburg field, Camp County, with connections to Picton, Winnsboro, and New Hope fields, carrying 10,000 barrels daily; also a connection into the East Mount Sylvan field, Smith County, to take the 160-barrel daily allowable.

Humble Pipe Line Company completed 5 miles of 10-inch loop from Gladewater toward Hawkins on East Texas field terminal line; capacity booster to 55,000 barrels daily. Wood Engineering & Construction Company, Tyler, Texas, contractor.

Lone Star Gas Company completed a 9-mile, 10-inch lateral from Carthage field gasoline plant to United Gas's Longview-Carthage line, also completed in 1947.

Magnolia Pipe Line Company is constructing a 647-mile, 20-inch crude carrier from Corsicana to Patoka, Ill. The line connects with company's Midland-Corsicana line, now being looped. New carrier to carry 100,000 barrels daily. Completion scheduled in spring of 1948. Oklahoma Contracting Company, Dallas; H. C. Price Company,

YEARS HAVE PROVED THE SUPERIORITY OF RECTORHEAD WELDED AND METAL-TO-METAL SEALS

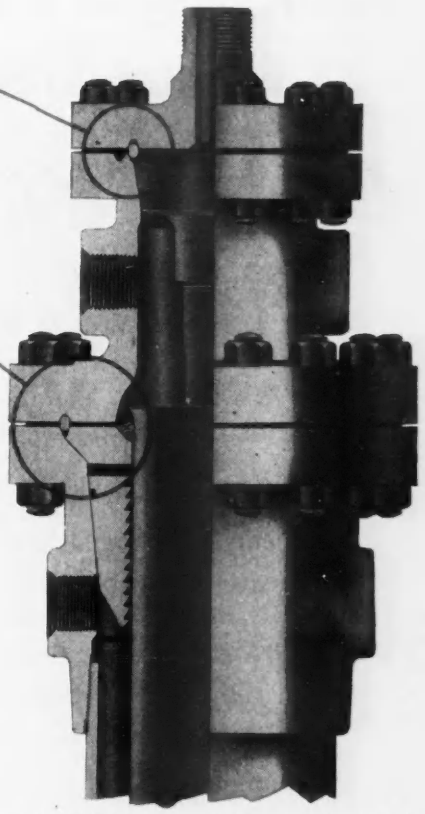


Type M Casing Head with double welding arrangement acting as seal and suspension medium. Type M tubing head with Type A hanger and hold down locking screws. Tubing head available with threaded side outlets. Bonnet studded for flanged master gate. Casing head available with flanged bottom connection. Furnished in 1000# to 10,000# working pressures.

The simple, easy-to-make weld, plus API ring gasket provides a strong, permanently leak-proof seal, between strings of pipe, that will not deteriorate, freeze or burn out, requires no maintenance or replacement. No RECTOR-HEAD seal, to our knowledge, has ever been affected by corrosion.

The patented design of RECTOR-HEADS uses a floating welding ring instead of bulky welding flange or complicated resilient packing arrangements. Pipe and welding rings are pre-heated simultaneously . . . cool evenly. The weld is never subjected to stress or strain during or after welding. STRESS RELIEVING IS NOT REQUIRED. Your regular field welder can make the weld in one hour or less.

Don't risk your well investment. Don't invite the trouble or danger or short-lived seals between strings of pipe. Use RECTORHEADS with the proven, permanent, trouble-free welded and metal-to-metal seals.



RECTORHEAD Type RH Casing Head with slip suspension and welded seal. Type M tubing head with Type A hanger. API ring gasket acts as seal and hold down. Tubing head available with flanged outlets. Bonnet available with flanged upper connection. Casing Head available with flanged bottom connection. Furnished in 1000# to 10,000# working pressures.

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Bartlesville; Eastern Construction Company, Dallas, contractors.

Memphis Natural Gas Company sent a new application to FPC in late 1947 for 1016-mile, 24-inch gas line from East Texas to Pittsburgh; 669 miles to Louisville to be constructed in 1949, 290 miles to Carlington, Ohio, in 1950, extension to Pittsburgh in 1951.

Pan American Pipe Line Company finished 29 miles of 6-inch line completely replacing the system acquired from Central Pipe Line Company in 1946. Wood Engineering and Construction Company, Tyler, contractor.

Talco Pipe Line Company has completed 2 miles of 4-inch discharge line from Normal-Paul field to Merigale field.

Texas Eastern Transmission Corporation purchased the Big and Little Inch lines for $143,127,000 and converted them for gas transportation to the Atlantic Coast, under proviso that the lines be maintained for emergency reconversion to oil. The company asked FPC authorization to construct 66 miles of laterals connecting to systems in the Philadelphia and New Jersey areas, and 24 compressor stations with anaggregate of 122,000 hp. Later, 4 compressor stations were authorized, with a total of 28,000 hp, to increase delivery capacity of the lines from 140 million to 250 million cubic feet daily; then 6 more stations, upping ultimate capacity to 340 million by August 1, 1948. Some station work is under way. Future construction includes 66-mile line from Little Inch terminus at Texas City to Pledger gas field, Brazoria County, Texas Gulf Coast; a line to connect Hico-Knowles gas field with Little Inch in Lincoln Parish, La., branch lines in Philadelphia area, to which the company won permission to extend its lines, and 21 new compressor stations with a total of 153,000 hp.

Tennessee Gas Transmission Corporation will complete early in 1948 a 73-mile, 20-inch line from the Carthage gas field to trunk line near Natchitoches, La. Capacity, 100 million gas daily. Latex Construction Company, Houston, contractor.

Trans-Continental Gas Pipe Line Company, Inc. filed a second amended application with FPC for construction of 1380 miles of 26-inch transmission line from Hemphill, Sabine County, to New York area in 1949-50.

Triangle Pipe Line Company is constructing 40 miles of 8-inch products line from Carthage to Shreveport, La., to connect with El Dorado, Ark., system. The line will carry an estimated 20,000 barrels daily. Sheppard-Geiger Construction Company, contractor.

United Gas Pipe Line Company completed 33 miles of 20-inch gas line from Carthage field to Longview station of the TET Big Inch line. Brown & Root, Houston, contractor.

North Texas

Continental Pipe Line Company completed a 14-mile, 4-inch gathering system in the Hildreth and Lewis-Stuart fields, Montague County, carrying 4000 barrels of crude to Magnolia's trunk line.

Continental Pipe Line Company completed 8 miles of 4- and 3-inch extension line from Ewalt field, Throckmorton County, to Sztygold field.

Highlander Gasoline Company completed 9 miles 6-inch extension of gas gathering system, obtaining 1½ million cubic feet of residue gas daily from Continental Oil's plant in Hildreth field.

Lone Star Gas Company constructed a 20-mile, 10-inch extension of system from Breckenridge to Kendall and adjacent areas, Young County.

Shamrock Oil & Gas Corporation completed 4½ miles of 20-inch gas residue, 6 miles of 6-inch gas line in gathering system near Dumas plant. Vaughn & Taylor Construction Company, Wichita Falls, Texas, contractor.

Sinclair Refining Company, Pipe Line Department, completed 1 mile of 3-inch, removal of 3/5 mile of 3-inch gasoline lines, near Dallas. Vaughn & Taylor contractor.

Sinclair Refining Company prepared to begin work on 180 miles of 8-inch products line from Arlington, between Dallas and Fort Worth to Shawnee, Okla., the Panova station near Pauls Valley. Scheduled completion date, summer 1948 Line connects from North Texas terminal of Gulf Coast-South Texas system now under construction. May later be carried to Columbus, Ohio. Pacific Pipeline & Engineers, Ltd., Los Angeles, contractor.

The Texas Pipe Line Company completed replacement of 2-3-4-inch lines with 4 miles of 6-inch, 7½ miles of 4-inch.

Toronto Pipe Line Company completed 8 miles of 4-inch crude gathering system from Lawson and Humphrey-Chapman fields, Haskell County, to a loading rack at Haskell.

Southwest Texas

Houston Industrial Gas Company is constructing a 37-mile, 10-inch line from Yoakum field to El Tora. C. W. Sternberg, Houston, contractor.

Magnolia Pipe Line Company is laying 10 miles of 8-inch line in the Edna area. Altgilt Construction Company, Corpus Christi, contractor.

Pan American Pipe Line Company completed a crude gathering system in Dirks, Pettus, S. Caesar, N. Pettus and Tulsita fields, consisting of 24¾ miles of 4-6-inch pipe.

Reynosa Pipe Line Company completed 17 miles of 12-inch gas line to connect with 135 miles of 14-inch line laid by Gas Industrial de Monterrey, S. A. The U. S. section of the line originates in South Weslaco field, Hidalgo County, and runs to a point east of Reynosa on the Rio Grande. Capacity, 40 million cubic feet daily. O. C. Whitaker Company, Fort Worth, contractor.

Rio Grande Valley Gas Company completed a 43½-mile, 10-inch loop on its 12-inch trunk line from San Salvador to San Benito.

Sinclair Refining Company completed 190 miles of 8-inch, 82 miles of 6-inch, 53 miles of 6-inch from Corpus Christi to Austin, Austin to Bryan, and a lateral from the Corpus-Austin line to San Antonio, starting near Luling. At Bryan the system ties into the products carrier being built to Arlington from Houston. H. C. Price Company, Bartlesville, Okla., and O. C. Whitaker Company, Fort Worth, contractors.

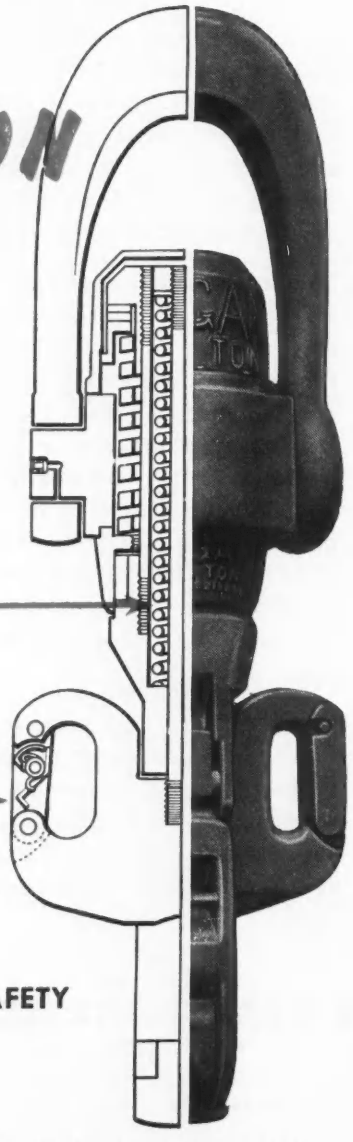
Tennessee Gas Transmission Company completed extension of its main line to the San Salvador gas field, Hidalgo County, from a point in Nueces County: 95 miles of 16-inch, carrying 96 million cubic feet of gas daily. Associated Contractors and Engineers, Houston, contractor.

Tennessee Gas Transmission Company is constructing 400 miles of 26-inch, 10 miles of 24-inch loops on its Texas-West Virginia system, and has completed 3 compressor stations at Fostoria, Victoria, and Natchitoches, La.

Tennessee Gas Transmission Company re-

Facts worth remembering about Regan's New Compact, Forged Steel

COMBINATION HOOK...



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✓ **MAIN STEM**—The rugged alloy steel tubular main hook stem is properly designed to resist tension, bending and torsion loads.

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ceived FPC approval of Application 808 to complete looping of its second Texas-West Virginia 26-inch line approximating 552 miles of 26-inch line, 69 miles of 24-inch, and 82 miles of 20-inch loop, as well as a line from the Carthage field, East Texas to the new Natchitoches, La., compressor station. Increased capacity of 290 million cubic feet will be obtained. The following 26-inch loops were designated: from point east of Station 5, Winn Parish, La., 81 3/5 miles to point north of Monroe; 26 miles from point in Tallahatchie County, Miss., to Batesville; 31 miles from point in Lafayette County to Benton County, Miss.; 36 miles from point in Decatur County, Tenn., to Lobelville; 92 3/10 miles from point in Barren County, Ky., to point in Garrard County. The 24-inch loop will be laid from point in Menifee County, Ky., 68 7/10 miles to Burnaugh. From Burnaugh to point northeast of Charleston, W. Va., 82 4/5 miles of 20-inch will be laid. Since both Application 701 and 808 were granted within a short time of each other, the two looping programs have been carried on simultaneously. Approximately 340 miles of 26-inch line, no 24-inch, were laid by the end of 1947.

Tennessee Gas Transmission Company applied to FPC for permission to extend its lines into New England, and lay a third loop. The application specified 5 new compressor stations and additional compressor units in existing stations; approximately 770 miles of 30-inch main loop; 124 miles of 26-inch loop along existing lines between Corpus Christi, Texas, and Burnaugh, Ky.; an extension of approximately 170 miles of 26-inch, 480 miles of 24-inch, and 140 miles of 20-inch from Burnaugh to point near Boston, Mass.; a 65-mile, 16-inch spur from a point in Ohio to point near Pittsburgh; various lateral gathering lines and facilities. This third program will increase capacity by 455 million cubic feet to 1,055,000,000 total.

Transcontinental Pipe Line Company has application before FPC for construction of 1839 miles of 26-inch gas line from Lacy and McAllen fields, Cameron and Hidalgo counties, to New York and Brooklyn via Satsuma, Baton Rouge, Atlanta, with Baltimore, Philadelphia and New Jersey laterals. Construction was proposed for 1949, completion in 1951. Two other parallel lines are planned later. Estimated capacity, 375 million cubic feet daily.

Texas Panhandle

El Paso Natural Gas Company completed 251 miles of 24-inch gas line from the Panhandle gas field to connect with the 26-inch line at Eunice, N. M., from which point the line continues to a 30-inch connection at Blythe, Calif., and terminates at Los Angeles. Capacity of line, 125 million cubic feet daily.

Michigan-Wisconsin Pipe Line Company has started construction on 810 miles of 24-inch gas line, 360 miles of 22-inch, and 11 miles of 18-inch, with 310 miles of 14-2-inch laterals, from Panhandle gas field, Hansford County, to Austin storage field, Mecosta County, Mich., and Green Bay, Wis. Capacity, 325 million cubic feet per day. Construction includes 14 compressor stations totaling 123,600 hp. Austin Feld Pipe Line Company constructing line to take gas on to Detroit area. J. R. Horrigan Construction Company, Houston, contractor for first 225 miles. Scheduled completion date, April, 1950.

Panhandle Eastern Pipe Line Company is still working on its looping program authorized early in 1947, including 391 miles of 18-26-inch loops, 5 lateral lines to Michigan crossings, a compressor station in Hansford County, Texas, and other stations, in Texas, Michigan, Kansas, Missiuri, Illinois, and Indiana. Capacity would be increased 80 million cubic feet. Of the "B" Facilities, 356-4/5 miles of 26-inch line have not been laid, or contracts awarded for construction. Only work completed was 50 miles of 18-inch line from Shamrock Oil and Gas Company's plant, Moore County to Hansford compressor station; also 24 miles of 26-inch loop from Tuscola station along present loop lines.

Panhandle Eastern Pipe Line Company was given FPC approval on its "C" Facilities involving 355 miles of 26-inch loops, and 31,600 compressor horsepower additions to existing stations. Capacity will increase by 107 million cubic feet per day, to a total of 580 million cubic feet.

Phillips Petroleum Company completed 7 of the thirteen 8-inch loops authorized during 1946 on its Borger-Wichita, Kansas-Chicago products system. The following loops were completed: 10½ miles from Borger, 7 miles from Spearman, 6 4/5 miles from Darrouzett, 7 3/10 from Cassoday, Kansas, 9 miles from Madison, 8 7/10 miles from Sharpe, 7-1/10 miles from Richmond. To be completed early in 1948 were 9 3/10 miles from Laverne, Okla., 8 4/5 miles from Buffalo, 8 1/10 miles from Hardtner, Kansas, 7 4/5 miles from Medicine Lodge, 8 miles from Cheney. Vaughn & Taylor and Deaton & Sons, contractors.

Phillips Petroleum Company has completed only 167 miles from Borger to La Junta of its projected 365-mile, 6-inch products carrier to Denver, because of lack of pipe. H. C. Liles Construction Company, Oklahoma City, contractor for this spread. Albert Johnson Construction Company, Oklahoma City, is completing 37 miles from Borger to McKee, including 1½-mile river crossing.

Texoma Natural Gas Company completed 25 4/5 miles of 26-inch loop, from a point 25 4/5 miles from northern terminus of line, to Natural Gas Pipeline Company of America's Station 2 in Oklahoma Panhandle. R. H. Fulton & Company, Lubbock, Texas, contractor.

Texoma Natural Gas Company has awarded contract for 10 3/5 miles of 26-inch loop, from a point 35 1/5 miles south of Natural Gas Pipeline's Station 2 to south end of 26-inch loop constructed in 1947. R. H. Fulton & Company, contractor.

Upper Texas Gulf Coast

Dow Chemical Company is constructing 18 miles of 4-inch, 24 miles of 12-inch gas lines from Citrus Grove field to Dow's plant at Freeport. Job includes 1500-foot 14-inch Colorado River crossing. Latex Construction Company, Houston, contractor.

Gulf Refining Company, Houston Pipe Line Division started late in 1947 loops on its Lufkin to Port Arthur refinery system: 11 miles of 10-inch from Lucas to Port Arthur; 9 1/10 miles of 8-inch from Lufkin to Chester; 14 2/5 miles of 10-inch from Sour Lake to Port Arthur. Latex Construction Company, contractor. These are in addi-

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tion to looping program under way from Midland, Texas, to Lufkin.

Humble Oil & Refining Company completed 31 miles of 3-inch, 8 miles of 8-inch distillate carrier from Anahuac to Baytown and Webster to Baytown. J. R. Stewart Construction Company, Houston, contractor.

Humble Oil & Refining Company completed 8 miles of 8-inch crude line between Webster station, Harris County, and the Baytown refinery.

Humble Oil & Refining Company completed 40 miles of 20-inch crude carrier from Satsuma station, Harris County, to the Baytown refinery. This is largest crude line in Gulf Coast region. Capacity 150,000 barrels daily; can handle 233,000 barrels. Increased facilities at Satsuma and Baytown involved laying of 1 mile 26-inch, 3 miles 16-inch line to replace 12- and 8-inch lines. Latex Construction Company, Houston, contractor.

Humble Oil & Refining Company relaid 15 7/10 miles of 4-inch line after removing 22 7/10 miles of 4-inch between Navarro Crossing and Long Lake. Smith Contracting Company, Ft. Worth, contractor.

McCarthy Oil & Gas Corporation prepared to construct 22 miles of 12¾-inch, 23 miles of 14-inch, 20 miles of 16-inch, 10 miles of 20-inch from Jackson Pasture field to Winnie plant, from there to Orange. Total capacity of lines, 100 million cubic feet. Anderson Brothers Corporation, Houston, contractor.

The Ohio Oil Company completed 11 miles of 6-inch line connecting the Orange Hill field, Austin County, to TGT near Wallis. Not yet completed is a 7½-mile outlet for the Nada field, Colorado County, which is to connect with TGT's 24-inch line between Nada and El Campo.

Shell Pipe Line Corporation completed 100 miles of 6-inch products line from Sheridan field natural gasoline plant to the Deer Park refinery, near Houston. Capacity 8700 barrels, but normal throughput 3000-4000. Line is operated as common carrier.

Sinclair Refining Company is constructing 260 miles of 10-inch products line from Houston to Arlington, between Fort Worth and Dallas, via Bryan, where system connects to lines from Southwest Texas. Contract has been awarded to continue system out of Arlington, North Texas, to Oklahoma, later to Ohio, where it will connect with the recently extended lines in Indiana and the Atlantic Coast. H. C. Price Company, Bartlesville, contractor.

Superior Oil Company completed a gas gathering system in the Altair field, Colorado County, and a 70-mile, 8-inch line from the field to the Lake Creek absorption plant. Latex Construction Company, Houston, contractor.

The Texas Pipe Line Company is planning to construct an 80-mile, 22-inch crude line from Houston to the Port Neches refinery, with capacity of 160,000 barrels. Project, originally including a 60-mile, 16-inch line, no longer under consideration, delayed during 1947 by pipe shortage. Construction scheduled in spring of 1948.

Magnolia Pipe Line Company and The Texas Pipe Line Company are constructing a products system. Magnolia's line from Spindletop, near Beaumont to Hearne, 178 miles of 12-inch, is completed. Smith Contracting Company, Fort Worth, contractor. The line is linked by feeders from refineries at Port Arthur and Beaumont. The Texas Pipe Line Company is constructing 172 miles of 10¾-inch line from Hearne to Dallas, 26 miles of 8⅝-inch from Dallas to Fort Worth, and extensions of 79 miles of 8-inch from Hearne to Austin, 28 miles of 6-inch from Austin to San Marcos, where it connects with an existing 6-inch carrier that takes products into San Antonio. Associated Contractors & Engineers, Houston; Latex Construction Company, Houston, contractors.

Trunkline Gas Supply Company has not yet received FPC approval of its plan to construct an 885-mile, 30-inch line from Wharton County to Keokuk County, Iowa, carrying 425 million cubic feet of gas.

United Gas Pipe Line Company completed a gathering system in Segno field, Polk County.

West Texas

Arizona Pipe Line Company is still considering plans to transport 14,000 barrels of Permian Basin crude to a proposed refinery at Phoenix. The carrier would be 620 miles of 8-inch with 4 stations on line, but construction is not likely until 1951.

Atlantic Pipe Line Company boosted capacity of its 10-inch crude carrier between Midland and Atreco by 5000 barrels through additions to its compressor units.

Col-Tex Refining Company completed 5 miles of 6-inch crude line, replacing old 3- and 4-inch pipe from its plant near Colorado City to the Westbrook field.

El Paso Natural Gas Company completed 36 miles of 14-inch natural gas line from a gasoline plant in the Fullerton field, Andrews County, to its plant near Eunice, N. M., where it will enter the system now serving California.

El Paso Natural Gas Company completed 18½ miles of 16-inch duplicate line from the TXL-Wheeler field to Keystone station, Winkler County, and 13 miles of 14-inch line from the station to the Jal, N. M., plant.

Empire Southern Gas Company was preparing to lay 10 miles of 8⅝-inch pipe from Shafter Lake field, Andrews County, to El Paso's Fullerton field station. Capacity, 10 million cubic feet.

Frio Pipe Line Company completed a 50-mile, 6-inch gas line westward from the Pearsall pool to Texas Gas Utilities Company line carrying aprpoximately 5 million cubic feet daily.

Gulf Refining Company, Houston Pipe Line Division completed an extension of its West Texas system by 12 miles of 6-inch line from the Jordan-Ellenburger field, Ector County, to an Ellenburger discovery, Crane County.

Gulf Refining Company, Houston Pipe Line Division continued a looping program on its Midland-Lufkin carrier, starting late in 1947, increasing system's capacity by 5000 barrels of crude. Approximately 100 miles of 10-inch loops have been contracted by Smith Contracting Company, Fort Worth. The following loops were completed: 18½ miles from Lufkin to a point west, 10¼ miles from Elkhart to Wortham, 5¼ miles from Wortham to Grandview, 3½ miles from Grandview to Weatherford. Loops under way or to be completed in 1948 are 10½ miles from Ranger to Clyde, 12 miles from Clyde to Sweetwater, 10 miles from Sweetwater to Coahoma, 11¼ miles from Coahoma to Midland.

REPORT TO THE COMPTROLLER OF CURRENCY OF THE CONDITION OF FROST NATIONAL BANK AT THE CLOSE OF BUSINESS WEDNESDAY, DECEMBER 31, 1947:

RESOURCES

CASH	$ 32,061,664.44
U. S. Government Obligations (all carried at par or less)	79,008,800.00
Investment Bonds and Municipal Obligations (all carried at par or less)	6,131,690.00
Stock in Federal Reserve Bank	120,000.00
Loans and Discounts	15,884,335.97
Interest Earned but not Collected	387,456.06
Customers' Liability Account Letters of Credit	26,920.29
Building Account	865,850.66
Other Real Estate Owned	1.00
TOTAL	$ 134,486,718.42

LIABILITIES

Capital Stock		1,200,000.00
Surplus		2,800,000.00
Undivided Profits—Net		594,356.52
Reserve for Undeclared Dividends		96,000.00
Reserve for Taxes, Interest, etc.		388,952.89
Interest and Discount Collected but not Earned		47,858.37
Liability Account Letters of Credit		51,846.53
DEPOSITS: Commercial	$78,672,942.63	
Correspondent Banks	15,936,721.08	
Time	22,407,641.91	
Public Funds	8,652,398.73	
United States Government Deposits	949,386.90	
Other Deposits, Certified & Cashier's Checks, etc.	2,688,612.86	129,307,704.11
TOTAL		$ 134,486,718.42

FROST
NATIONAL BANK
OF SAN ANTONIO, TEXAS

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Gulf Refining Company, Houston Pipe Line Division completed 6 miles of 6-inch extension from the Rankin station, McCamey County, to a wildcat discovery in Crockett County.

Gulf Refining Company, Houston Pipe Line Division will construct in 1948 4 miles of 3-inch crude line from the Jordan-Ellenburger field to its main line.

Gulf Oil Corporation has awarded contract for construction of 7 miles of 24-26-inch crude line from the Goldsmith pool to O. R. Smith Contracting Company, Fort Worth.

Humble Pipe Line Company completed several loops on its West Texas trunk line; 13-9/10 miles of 10-inch, 35 miles of 12-inch, and replaced 12 miles of 8-inch with 12-inch, boosting system's capacity by 11,000 barrels of crude daily. C. W. Sternberg and Latex Construction Company, both of Houston, contractors.

Humble Pipe Line Company extended its crude gathering system from the Martin field by laying 25 miles of 6-inch to the Andector field, and thence southwest to the Wheeler field, from there 17 miles of 8-inch were laid to Winkler station, and a lateral 4 miles of 4-inch to Keystone Ellenburger production. Some 8-inch line was relaid.

Humble Oil & Refining Company completed 12-4/5 miles of 6-inch, 5-1/5 miles of 6-inch, 12 miles of 6-inch crude lines between Albany, Shackleford County, and Putnam, Callahan County. The line was rerouted and shortened.

Humble Oil & Refining Company laid 8 miles of 8-inch discharge line from a wildcat discovery in Ector County to its Wink-McCamey system.

Humble Oil & Refining Company took up 22-7/10 miles of 4-inch line and relaid 15-7/10 miles of 4-inch between Navarro Crossing and Long Lake. Smith Contracting Company, Fort Worth, contractor.

Humble Oil & Refining Company completed laying 10-4/5 miles of 8-inch line from Ector station to Judkins station. J. J. Willis Company, Odessa, Texas, contractor.

Humble Oil & Refining Company started construction January 1, 1948, of 10½ miles of 8-inch line from Dollar Hide field, Andrews County, to Dublin station, connecting with the Hobbs-Winkler main line. Morrison Brothers Construction Company, Odessa, Texas, contractor.

Humble Pipe Line Company completed 2½ miles of 6-inch gathering lines in the Doss field and laid a 6½-mile, 4-inch line from there to Seminole. Curtis Brothers Construction Company, Andrews, Texas, contractor.

Magnolia Pipe Line Company completed a crude gathering system in Northwest Slaughter field, consisting of 6 miles of 4-inch discharge line, 21 miles of 2-6-inch gathering lines. R. H. Fulton & Company, Lubbock, Texas, contractor.

Magnolia Pipe Line Company completed 17 miles of 8-inch extension line from Fullerton field to Nelson field, Andrews County, extending from there 6 miles of 4-inch to Eunice, N. M. R. H. Fulton & Company, contractor.

Magnolia Pipe Line Company installed several 12-inch loops on its 12-inch Midland-Corsicana transmission line, boosting capacity from 65,000 to 80,000 barrels of crude per day. At Corsicana the line connects with the carrier now being constructed to Patoka, Ill. Loops completed were 22-1/10 miles west from Mertens station, 16½ miles west from Walnut Springs station, 30 miles west from De Leon station, 16-1/10 miles west from Sweetwater station, 13-4/5 miles west from Iatan station, Oklahoma Contracting Company, Dallas, contractor.

Mextex Pipe Line Company (Phillips Petroleum Company) increased capacity of its 8-inch products and crude carrier from West Texas to the Borger refinery to 25,000 barrels per day by installation of booster stations near Fullerton and Olton fields.

Mextex Gathering Lines (Phillips Petroleum Company) completed a 4-inch crude gathering system in Fullerton and Fullerton-Devonian fields, and laid a 5-mile, 6-inch discharge line from the field station to its trunk line.

Midway Pipe Line Company (Consumers Cooperation Association) still was considering construction of 625-mile, 8-inch crude carrier from the Permian Basin to Valley Center, Kansas.

Pasotex Pipe Line Company (Standard Oil Company of California) completed 98 miles of 10¾-inch crude line from Wink station to Yates field. Smith Contracting Company, Fort Worth, contractor. Company also increased capacity of its 195-mile, 8-inch crude carrier from Wink to El Paso by 5000 barrels daily after installing 4 additional booster stations.

Phillips Petroleum Company completed 55 miles of gathering lines in the Fullerton field. Vaughn & Taylor Construction Company, Wichita Falls, Texas, contractor.

Phillips Petroleum Company is laying 6 miles for a gas gathering system in Goldsmith area. Smith Contracting Company, Fort Worth, contractor.

Scurlock Oil Company completed a 26-mile, 6-inch crude line from Jameson field, Coke County, to a loading rack near Colorado City.

Shell Oil Company completed three 4-inch products lines from TXL gasoline plant, Ector County, to a loading rack near Judkins. Distance, 15 miles.

Shell Pipe Line Corporation constructed 6 miles of 4-inch crude gathering and discharge line from Page area to McCamey Houston trunk line. The unit replaces a 2-inch connecting line of Cooper Gas Company.

Shell Pipe Line Corporation is constructing 9½ miles of 8-inch crude line to its West Texas trunk system at the Upton station

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Were It Not So Cheap There Would Be No GRAY MARKET

You never hear of a "black market" or a "gray market" when prices on any commodity are in balance with demand.

But, when prices are held down in the face of over-demand, the unscrupulous speculator, by hook or crook, manages to buy at the legitimate market and sell for all the traffic will bear.

This is true whether prices are held down by Government regulation (which breeds "black markets") or by voluntary action on the part of producers (which breeds "gray markets").

Voluntarily, the steel industry has held down advances in the price of steel. Compared to virtually all other commodities, price advances in the last ten years on steel at the mills are extremely modest. Yet, costs of steel making have soared far above normal and the demand continues beyond our vastly increased steel producing capacity.

Were steel prices to advance 2¢ more per pound in line with advances in the prices of most other commodities, the "gray market" in steel would vanish.

Sheffield prefers to fight the "gray market" and inflation—

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2nd—By distributing them through regular established and reputable distributors and dealers.

3rd—By asking all of our customers not to resell at more than regular market prices.

4th—By imploring all users of steel products not to pay more than regular market prices.

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from a deep Ellenburger discovery in Upton County. **Morrison Brothers Construction Company**, Odessa, contractor.

Shell Oil Company, Inc. heads a group of companies considering plans for a 20-inch crude carrier from the West Texas Permian Basin to California, terminating near the Wilmington refineries. Approximately 150,000 barrels would be transported daily if plans materialize. Mileage involved, approximately 1100.

Standish Pipe Line Company (Phillips Petroleum Company) has not yet been able to begin construction of its projected 289-mile, 12-inch crude outlet from the Permian Basin to the Borger refinery.

Standish Pipe Line Company completed a short loop, near the junction of its present 6- and 8-inch carrier from the Permian Basin to Borger. More loops will be installed when pipe is available.

Standish Pipe Line Company completed 7 miles of 4-inch gathering lines in the TXL field and 8 miles of 6-inch discharge from Goldsmith field station to the TXL trunk line.

Stanolind Pipe Line Company failed to construct 80 miles of 16-inch extension of its trunk line from Wasson field via Fullerton to Wheeler for lack of pipe. What pipe is available has been required for the current looping program. This line may be built in summer of 1948.

Stanolind Pipe Line Company completed a 12-mile, 2½-inch crude outlet for the Landon field, Cochran County, to connect with Magnolia's system. When 80-mile extension is constructed this line will be tied in.

Stanolind Pipe Line Company completed 10 miles of gathering and a 6-inch discharge line from Adair field to the Texas-New Mexico Pipe Line Company's carrier.

Stanolind Pipe Line Company completed a 70-mile, 8-inch extension of its West Texas-Oklahoma carrier from the Slaughter field west to the Cap Rock field, N. M. Smith Contracting Company, Fort Worth, contractor.

Stanolind Pipe Line Company was ready to lay 10 miles of 6-inch and 16 miles of 4-inch crude gathering lines in the Levelland field, Hockley County. C. L. Rogers Construction Company, Wichita Falls, contractor.

Stanolind Pipe Line Company continued looping of the Slaughter-Drumright trunk line, increasing crude system capacity by 14,000 barrels per day. A loop from Monroe to Post, North Texas, 49-miles of 8-inch, was completed in 1947, by R. H. Fulton & Company, contractor, who is also working on the Monroe-Floydada loop, 46 miles of 16-inch, later in program to be extended 57-3/5 miles to Childress. Loops starting in February: 5 miles of 16-inch from Bretch, Okla., station, 14 miles of 16-inch, near El Reno, 15½ miles near Drumright. The Bretch loop will be extended in summer 42½ miles, El Reno 38-3/10 miles, Drumright 37-4/5 miles.

Stanolind Pipe Line Company completed a 50-mile, 8-inch outlet from Post field, Garza County, to the main line near Petersberg. R. H. Fulton & Company, contractor.

Stanolind Oil & Gas Company awarded contract for 320 miles of various-sized pipe as gas gathering system for Slaughter field's Sundown station to Deaton & Sons Pipe Line Construction Company, Odessa.

Western Refiners Corporation was preparing to construct a gathering system in Tunstill field, Reeves County, with a line from the field to Orla, where loading rack will be constructed.

Utah

Mountain Fuel Supply Company is planning to construct a 35-mile gas line from its main line junction to Orem, Provo, Springville, Lincoln and Spanish Fork in spring of 1948.

West Virginia

Atlantic Seaboard Corporation and Virginia Gas Transmission Corporation asked FPC approval to construct 268 miles of 26-inch line from United Gas' Cobb station, near Glendenin, to Rockville, Md., to serve Washington Gas & Light Company.

Carbide and Carbon Chemicals Corporation was constructing 55 miles of 10-inch gas line from Charleston south to Shegon. Pacific Pipeline & Engineers, Ltd., Los Angeles, contractor.

Cumberland & Allegheny Gas Company applied to FPC to construct 7 miles of 6-inch gas line between Terra Alto and Oakland, Md.

Hope Natural Gas Company plans to lay 31 miles of 16-inch loop authorized by FPC, build a booster station, and install additional compressor units at the Cornwell station. FPC also approved construction of 58 miles of 20-inch loops on lines out of Wyoming gas field. The company has applied to FPC for authority to construct 26 miles of 14-inch loop line to complete the looping of its 90-mile line from Cornwell to Hasting station.

United Fuel Gas Company and Ohio Fuel Gas Company have application before FPC for 100 miles of 20-inch from TGT's line near Ceredo, W. Va., to Burlington, Fairfield County, Ohio.

United Fuel Gas Company was authorized to construct 70 miles of 20-inch line from Cobb station, Roane County, to Monongalia County connection with Manufacturers Light and Heat Company.

United Fuel Gas Company has asked FPC permission to build 50 miles of 16-inch lines in Kanawha and Wetzel counties.

Wisconsin

Wisconsin Southern Gas Company has filed an application with FPC to construct 5 miles of 6-inch line from connection with Natural Gas Pipe Line Company line to line from Pleasant Prairie, Kenosha County, to Genoa City, Walworth County.

Wyoming

The California Company is preparing to lay a 24-mile, 6-inch crude outlet from the Quealy Dome field to connect with Utah Oil Refining's line at Rock River.

The Ohio Oil Company, Pipe Line Department, completed a 13-mile, 8-inch crude line from Hidden Dome field to Durkee siding on Burlington Railroad.

The Ohio Oil Company, Pipe Line Department, laid 13 miles of 6-inch line from Neiber Dome field to the Chatham tank farm, also 7 miles of 12-inch line from Chatham to Stanolind's tankage at Kirby.

The Ohio Oil Company, Pipe Line Department, laid 1¼ miles of 8-inch tying into the Chatham-Greybull line from Durkee siding.

Powder River Pipe Line Company plans to construct in 1948 a 13-mile, 6-inch crude line from the Mush Creek field to Graco Oil Refining Company's refinery at Newcastle.

Rocky Mountain Gas Company is constructing 54 miles of 8⅝-inch gas line from Rawlins to Medicine Bow. Dawson & Corbett, Rawlins, contractor.

Rocky Mountain Pipe Line Company plans in 1947 included laying of 118 miles of 10-inch line from Horse Creek station north of Cheyenne to Denver, and looping with 8-inch pipe part of the line from the Guernsey station to Horse Creek.

Stanolind Pipe Line Company completed 12 miles of 8-inch crude outlet for the Hamilton Dome, Hot Springs County, field to connect with company's Elk Basin system.

Stanolind Pipe Line Company may build in 1948 a 70-mile, 12-inch loop on the line from Lysite to Casper. Pipe deliveries, delayed in 1947, scheduled for early 1948.

Stanolind Pipe Line Company may also construct a 130-mile 8-inch line from Wamsutter to Casper. Project dependent on pipe delivery, as are loops on line from Casper to Freeman, Mo.

Wyco Pipe Line Company is constructing a 271-mile, 8-inch products line from Casper to Denver via Cheyenne. Allred-Enix Construction Company, Houston, has completed a 40-mile spread from Casper to Chuckwater. Pacific Pipe Line & Engineers, Los Angeles, constructing southern half.

YOU can depend on WHITAKER to push a job through!

During more than 28 years of pipe line experience Whitaker crews have had a part in the construction of many of the nation's important oil and gas lines.

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Tanker Fleet Shortage to Be Eased

Modern large sea-going tanker, M. S. Esso Augusta, of the fleet of Standard Oil Company. This tanker is larger than the T-2 type, built in large numbers during the war. The Esso Augusta has a capacity of approximately 153,700 barrels.

THE world had a much larger tanker fleet at the end of 1947 than at the outbreak of war in 1939, yet an acute shortage of tankers constituted one of the most serious problems of the industry during the year. With the world-wide availability of crude oil and petroleum products, even in the U. S., largely dependent on tanker movements, this situation had much to do with the inability to get sufficient supplies to satisfy demand requirements in many regions.

On October 1, 1947, there were 1868 ocean-going tankers in the world with a deadweight tonnage of 23,585,800, which was in comparison with 1594 vessels of 17,033,000 deadweight tons on September 1, 1939. The speed of these ships had increased from an average of 11.07 to 13.10 knots per hour.

For better comparison purposes it is necessary to convert these vessels into T-2 type tanker equivalents, and on this basis the world's tankship fleet on October 1 of the past year totaled 1271 with a tonnage of 21,315,000 deadweight tons. This represented an increase since September 1, 1939, when hostilities commenced in Europe, of 495.8 ships and 8,312,000 deadweight tons.

Of the 1271 T-2 equivalent tankers in existence, 1005 were available for commercial transportation of petroleum and products. Others were not available for commercial usage due to various

T2-SE-A1 Equivalent
Availability of World Tank Ship Fleets
For Commercial Transportation of Petroleum and Products
(Source: U.S.M.C.)

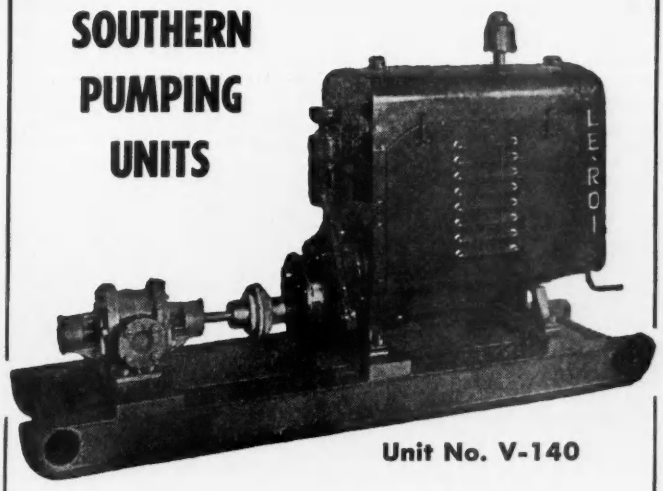
ITEM	World Fleets	UNITED STATES					Total Foreign
		Private and Maritime Commission			U.S. Navy	Total U.S.	
		Private	U.S.M.C.	Total			
Total Fleet, October 1, 1947	1,271	250	343	593	53	646	625
Sold or Final Approval	....	44	(124)	(80)	....	(80)	80
Transferred to U.S. Navy	....	....	(50)	(50)	50	....	....
Approved in Principle	....	18	(58)	(40)	....	(40)	40
Fleet After Transfers	1,271	312	111	423	103	526	745
Availability-							
Military	(144)	25	....	25	(78) (25)	(78)	(66)
Foreign Not Moving	(55)	....	....	....	....	....	(55)
PDX & Constructive Losses	(30)	....	(30)	(30)	....	(30)	....
In Other Than Petroleum Trade	(37)	(3)	....	(3)	....	(3)	(34)
Net Available	1,005	334	*81	*415	....	*415	590

* Includes 55 Z-ETI-S-C3 (Liberty Type) tankers equivalent to approvimately 26 T-2's.
Note: Parentheses ( ) represent a deduction or minus quantity.

Merchant Seagoing Steam and Motor Tankers of 1000 Gross Tons and Over
Under Construction or on Order as of July 1, 1947
(Source: U. S. Maritime Commission)

COUNTRY IN WHICH BUILDING	COUNTRY FOR WHICH BUILDING																	
	Total		United States		United Kingdom		Nether-lands		Norway		Denmark		Sweden		France		Spain	
	No.	DWT	No.	DWT	No.	DWT	No.	DWT	No.	DWT	No.	DWT	No.	DWT	No.	DWT	No.	DWT
United States	4	45,200	4	45,200	....	....	....	....	....	....	....	....	....	....	....	....	....	....
United Kingdom	69	950,215	....	....	39	475,615	4	24,400	24	425,000	2	25,200	....	....	....	....	....	....
Sweden	29	409,995	....	....	....	....	....	....	23	355,150	....	....	6	54,845	....	....	....	....
France	12	206,080	....	....	....	....	....	....	....	....	....	....	....	....	12	206,080	....	....
Netherlands	6	73,000	....	....	....	....	2	19,900	3	48,000	....	....	....	....	1	5,100	....	....
Spain	3	32,700	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	32,700
Denmark	1	10,900	....	....	....	....	....	....	1	10,900	....	....	....	....	....	....	....	....
Total, World	124	1,728,090	4	45,200	39	475,615	6	44,300	51	839,050	2	25,200	6	54,845	13	211,180	3	32,700

SOUTHERN PUMPING UNITS



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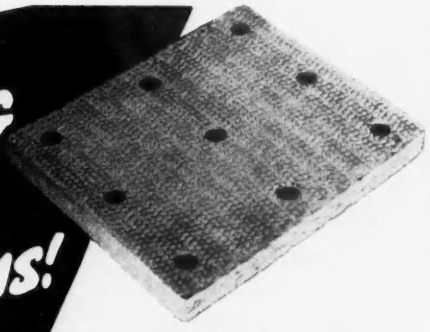

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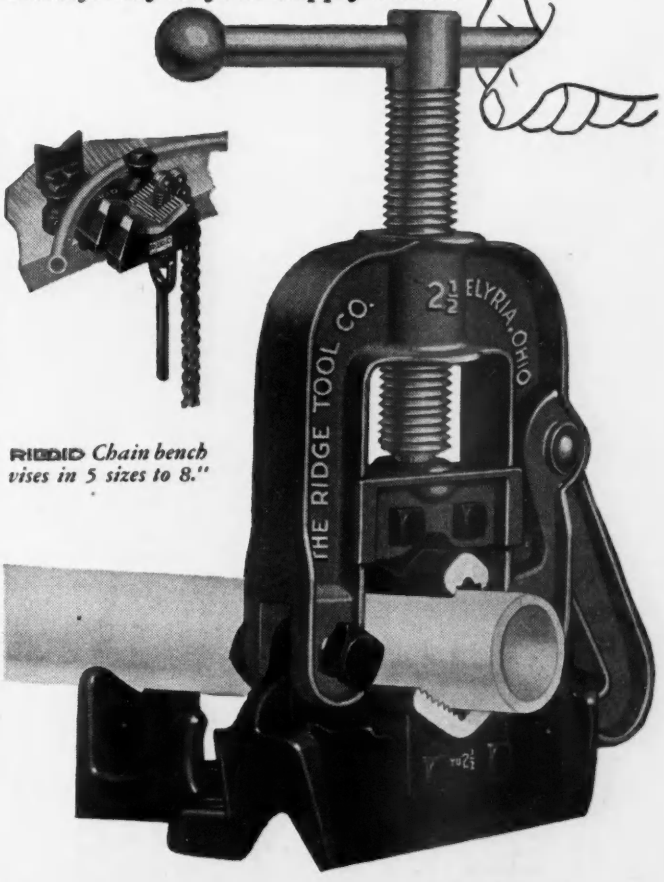

RIDGID Chain bench vises in 5 sizes to 8."

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THE RIDGE TOOL COMPANY • ELYRIA, OHIO

reasons, mostly because of being held by by military forces.

Ships constructed by the government during the war made the U. S. the leading tanker fleet nation of the world. At the outbreak of the war in Europe in 1939, the U. S. had a tanker fleet of 383 vessels aggregating 4,434,000 deadweight tons and constituting 26 percent of the world's tanker capacity. More than one-third of these ships were over 20 years old and their average speed was slightly over ten knots per hour. In 1945, when the war ended, the number of ocean-going tankers under the American flag had risen to 907, the tonnage had increased to 13,379,000 deadweight tons, and the average speed to 13.74 knots hourly. Most of these vessels were less than three years old.

In numbers the U. S. fleet at the end of the war compared with 1004 vessels carrying the flags of all other nations combined. In carrying capacity, however, the U. S. fleet represented 64 percent of the world's capacity.

"Surplus" Sold

Such an increase in number of tankers created the belief that a surplus tanker capacity existed, particularly as far as U. S. domestic commercial requirements were concerned. Since the foreign picture, due to so many vessels lost during the earlier days of the war, was the reverse, a policy of selling "surplus" tankers was adopted. Hence, latest figures (October 1, 1947) showed that the U. S. fleet had been reduced to 744 tankers of 11,171,400 deadweight tons, whereas the fleet for the rest of the world had increased to 1124 vessels with a deadweight tonnage of 12,414,400.

In terms of modern day T-2 equivalents, the October 1 fleet of the U. S. amounted to 646.4 vessels with 10,836,000 deadweight tons, or 50.9 percent of the world's total.

In view of the inability of the present fleet to transport all the petroleum desired by consumers, the construction program becomes increasingly significant. On July 1, 1947, a total of 124 tank ships with a deadweight tonnage of 1,728,000 was under construction. Most of the construction was for other nations, the U. S. having only four with a deadweight tonnage of 45,200.

However, the U. S. is expected to become more active in construction work because of acute needs. In January, 1948, negotiations were nearing completion for the construction of 13 new "super" tankers by three major oil companies. The vessels probably will approximate 27,000 deadweight tons each, have a service spread of 16½ knots hourly, and be capable of carrying more than 200,000 barrels of petroleum products.

World Tank Ship Fleets as of October 1, 1947, Actual Number, Gross and Deadweight Tonnage and T2-SE-A1 Equivalent Tonnage
(Ocean-Going Vessels 2,000 Gross Tons and Over)
Source: U.S.M.C.—Division of Research

	OCTOBER 1, 1947					T2-SE-A1 EQUIVALENT		
				Average				
FLAG	No.	Gross Tons	Deadweight Tons	Dead-weight	Speed	No.	Deadweight Tons	% of World
Western Hemisphere:								
United States	744	6,995,223	11,171,400	15,015	14.07K	646 4	10,836,900	50.9
Government	449	4,262,497	6,754,100	15,043	14.26	396.3	6 644,000	31.2
U.S.M.C.	407	3,798,767	6,008,700	14,763	13.87	342.9	5,748,700	27.0
Military	42	463,730	745,400	17,748	17.43	53.4	895.300	4.2
Private	295	2,732,726	4,417,300	14,974	13.76	250.1	4,192,900	19.7
Panama	132	1,063,528	1,688,500	12,791	14.44	100.3	1,681,500	7.9
Others:								
Argentina	28	178,235	251,400	8,978	9.52	9.9	166,000	0.8
Brazil	5	30,183	44,000	8,800	10.21	1.9	31,900	0.1
Chile	2	7,586	9,600	9,600	11.00	0.4	6,700	.....
Honduras	2	14,071	21,000	10,500	11.29	0.9	15,100	0.1
Mexico	12	74,122	114,600	9,550	10.50	5.0	83,800	0.4
Peru	1	2,820	4,300	4,300	10.00	0 2	3,400	.....
Philippines	.....	.....	.....	.....	.....	.....	.....	.....
Uruguay	2	20,592	33,600	16,800	14.50	2.0	33,500	0.2
Venezuela	25	72,092	99,300	3,972	9.86	4.0	67,000	0.3
Sub-Total "Others"	77	399,701	577,800	7,504	10.21	24.3	407 400	1.9
Total Western Hemisphere (Excluding Canada and Including Philippines)	953	8,458,452	13,437,700	14,100	13.95	771.0	12,925.800	60.7
Europe:								
Great Britain	436	3,252,332	4,789,500	10,985	11.88	234.1	3,924,700	18.4
Norway	195	1,658,333	2,157,300	12,909	12.20	126.3	2,117,400	9.9
Netherlands	80	409,919	570,700	7,134	11.14	26.1	437,600	2.1
France	33	269,155	410,500	12,439	12.27	20.7	347,000	1.6
U.S.S.R.	25	174,696	266,800	10,672	11.83	13.0	217,900	1.0
Germany	4	32,989	50,400	12,600	12.87	2.7	45,300	0.2
Italy	35	248,433	374,000	10,686	12.08	18.6	311,800	1.5
Sweden	36	322,683	491,100	13,641	13.32	26.9	451,000	2.1
Others:								
Belgium	6	47,453	71,600	11,933	12.01	3.5	58,700	0.3
Denmark	11	96,597	149,400	13,581	11.79	7.2	120,700	0.6
Finland	3	21,297	33,500	11,167	10.62	1.5	25,100	0.1
Greece	6	28,235	42,500	7,083	9.84	1.7	28,500	0.1
Poland	1	6,487	9,300	9,300	10.50	0.4	6,700	.....
Portugal	5	29,269	44,600	8,920	11.85	2.2	36,900	0.2
Spain	21	121,835	168,800	8,038	11.30	7.8	130,800	0.7
Switzerland	2	11,571	17,900	8,950	10.28	0.9	15,100	0.1
Turkey	1	6,134	9,000	9,000	14.00	0.5	8,400	.....
Yugoslavia	1	6,074	9,400	9,400	11.50	0.4	6,700	.....
Sub-Total "Others"	57	374,952	556,000	9,754	11.40	26.1	437,600	2.1
Total Europe	901	6,743,492	10,026,300	11,127	11.99	494.5	8,290,300	38.9
Japan	9	47,805	68,500	7,611	12.65	3.6	60,300	0.3
China	4	30,475	46,000	11,500	10.00	1.9	31,900	0.1
Egypt	1	5,917	7,300	7,300	13.00	0.4	6,700	.....
Total, World Fleet	1,868	15,286,141	23,585,800	12,626	13.10	1,271.4	21,315,000	100.0

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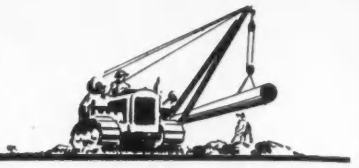


$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas

How To—Indicate Liquid Level in Pump Waste Barrel

A time-saving feature which will contribute much to the general cleanliness of a field pipeline booster pump installation and facilitate the checking of the slop barrel fluid level, is contained in the idea utilized by one pipe line company operating in the North Texas area. Because the equipment is located in the middle of a field some distance from the usual path of travel, and the fact that to inspect the fluid level of the barrel, buried at ground level, would entail the breaking out or moving of pipe fittings, a float-actuated signal system was rigged.

The signal, consisting of a piece of flat metal painted white, which is attached to the upper end of a steel rod, the latter passing through the ground-level cover and on down to the float, indicates by its height above the ground the approximate times at which the sump should be pumped out.

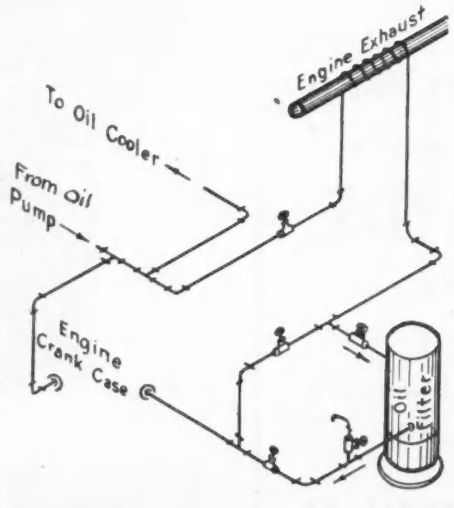
Inasmuch as leakage from packing glands as well as waste from the bleeder line flows into the barrel, there is no way of estimating when the container will require emptying other than with a signal system.

Visible from a distance, the signal will indicate to the pumper when attention must be given to the barrel without his having to check the installation every few days.

How To—Increase Lubricating Oil Filter Efficiency

On large horsepower internal combustion engines, the lubricating oil may be used for long periods of time without changing provided the oil is kept clean. Oil filters have been the answer to the problem, however, the efficiency of these elements has been materially increased by rearranging the filter system as shown.

Key to the effective filtration of all carbon and foreign matter from the oil lies in heating the oil. This has been accomplished by wrapping half-inch copper tubing around the exhaust pipe from the engine. The oil is piped from the oil pump to the heating coils around the exhaust and then through the filter elements and back into the crankcase of the engine.



When it is necessary to change filters, the oil can be temporarily by-passed by means of three valves. It is also possible to pump the oil to an oil cooler. A tap and valve on the discharge side of the filter provides a means of taking samples of the oil for testing and inspection. This system has been used for more than a year and has proven very practical.

How To—Support Gauge Lines

The flexible copper pipe from the tap in a gas flow line to the pressure recorder is easily broken or damaged. To prevent this happening, one company welds a ¾-inch collar to the flow line near the tap, and screws into it a 5-foot length of pipe. The copper tube is taken to this post and fastened there with a wrapping of friction tape. At the top of the support the copper tube is held loosely by means of a flat loop of wire pushed down into the upright pipe, the loop enclosing the tubing.

Fastening the gauge tubing in this manner and taking it into the gauge shack about head level protects the line from accidental breakage and gives clear headroom around the shack for weed and grass cutting. The method of protesting the gauge line is especially necessary if the lease is used for stock grazing, as cows will try to crowd into the shade cast by the shack and would trample a low line.

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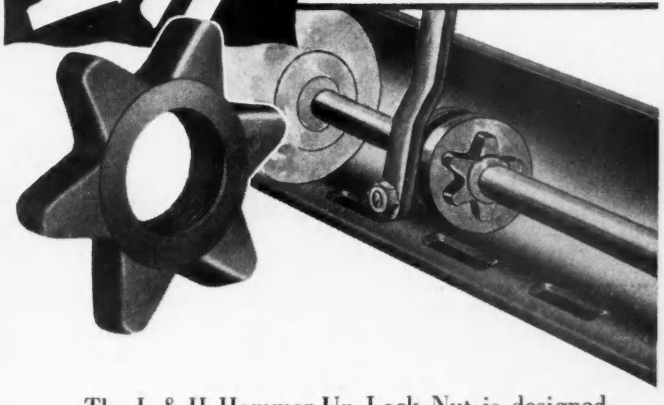

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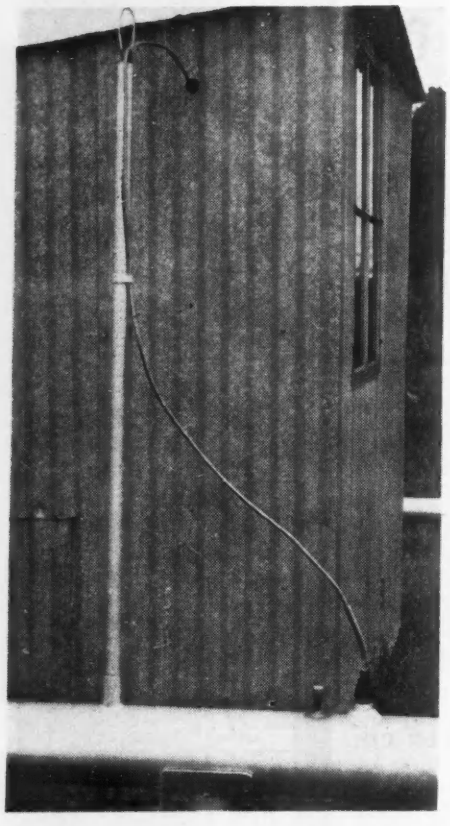
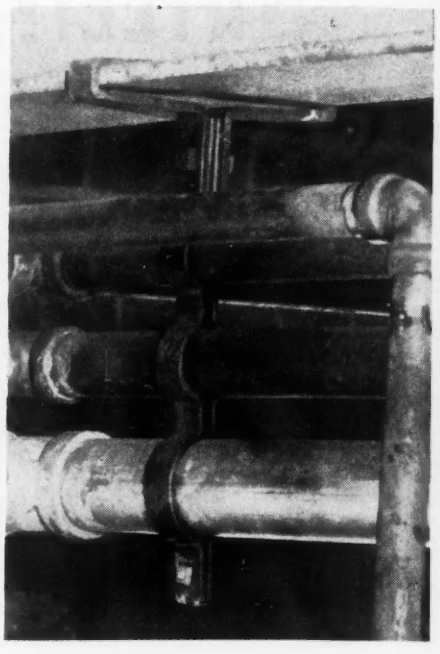


How To—Support and Space Overhead Piping

In planning new pumping or compressor stations, it is always of prime consideration to design the foundation for heavy engines and the concrete floor so that the most of the piping to and from the engines and compressors are below the floor surface. However, there are alterations and changes in engines and additions that make it necessary to add other piping such as water supply for cooling, fuel, lubricating oil, etc. These pipes, normally of small diameter, can be installed in the station house in a neat and orderly fashion by the use of a simple, yet effective pipe clamp and support.

The clamp is made of malleable strap iron, one-inch by ⅛-inch, and is formed to fit snugly around the size piping installed. The unit consists of four parts, each designed for its particular application. A bracket is made in two parts to fit the flange section of a structural I-beam or other overhead rafter beam, while the pipe holders are formed from



two pieces of strap steel rounded to carry the piping. Two bolts are all that is needed to hold this unit in place. Depending on the size of pipe, these clamps may be spaced about eight or ten feet apart to provide a simple yet convenient support for small-diameter overhead piping.

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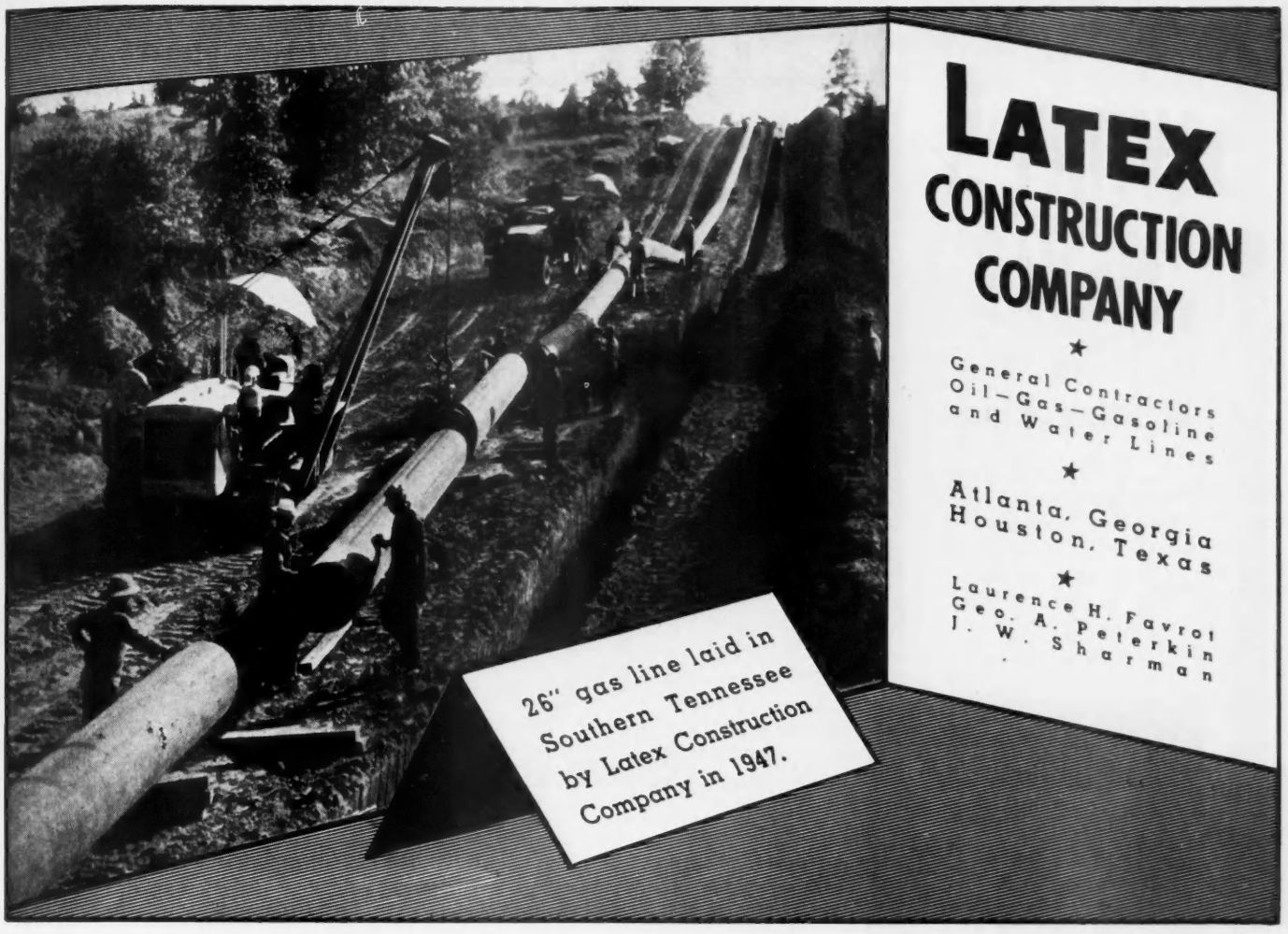
How To—Conserve Manila Rope

While Manila cordage is available in some areas now, it is far from being plentiful at most remote pumping and compressor stations. And, it is still important to take steps to conserve this material as much as possible. It is not so difficult to carry out such steps when the rope is placed in the warehouse for temporary storage until further needed, but it is a problem to reduce wear and tear on rope when placed in use.

A practical solution to the conservation program of equipment and materials may be found in the container illustrated. This simple barrel is made from galvanized sheet metal and is used as a storage vessel for rope. It is approximately 30 inches in diameter and four feet high. Handles are bolted to each



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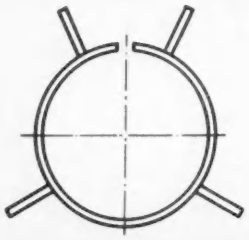

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side to provide a convenient means of handling.

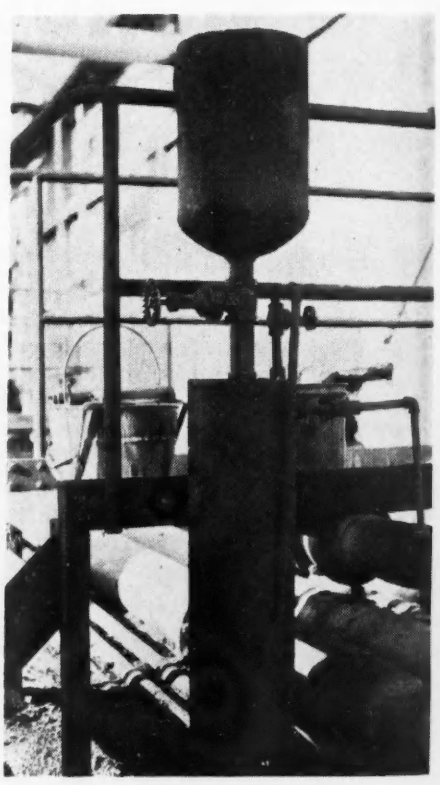
The lid is made of two semi-circular pieces, each hinged at opposite points on the circumference so the two sections will open outward. An overlap of six inches across the middle provides adequate protection from weather. Matching slots have been cut in each section so the rope may be fed in and out of the metal container while the lid is down.

In use, this metal barrel and its contents are taken to the job, and the rope is kept in the container as much as possible. It is not necessary to coil the rope up neatly but will handle easily if just merely fed into the barrel. It has a capacity of about 300 feet of one-inch line.

How To—Dispose of Spent Cleaning Solvents

Solvent which has been used for cleaning engines and parts can be disposed of safely by using a specially built blowcase. A section of 10-inch pipe is closed at both ends with flat heads into which collars are welded to attach the necessary piping. The piping connected to the lower head leads from the blowcase to a slop tank where the spent solvent is collected. The upper head is fitted with two collars, one to attach a pressure vent line and the other for attaching a pouring funnel below which is a gate valve for closing off when necessary.

A half-inch collar welded in the side of the blowcase near the top is used for attaching a pressure line. When dumping spent solvent, the gate valve in the line from the blowcase is closed as well as the pressure line valve. The vent line is opened, after which the two-inch gate below the pouring funnel is opened to permit fluid to run from the funnel into the blowcase. The procedure is reversed after all solvent has been dumped, and pressure gas applied to discharge the liquid through the disposal line into the slop tank. Several of these disposal units can be placed around the compressor station for added convenience.



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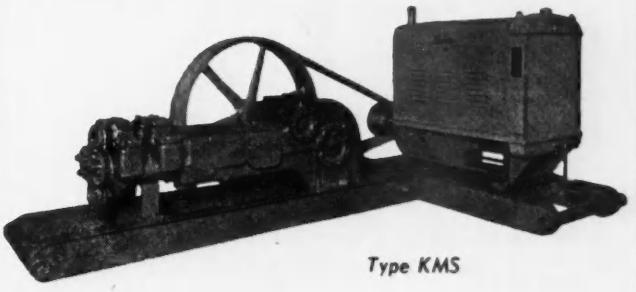

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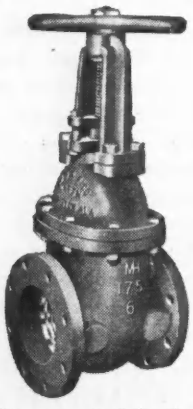

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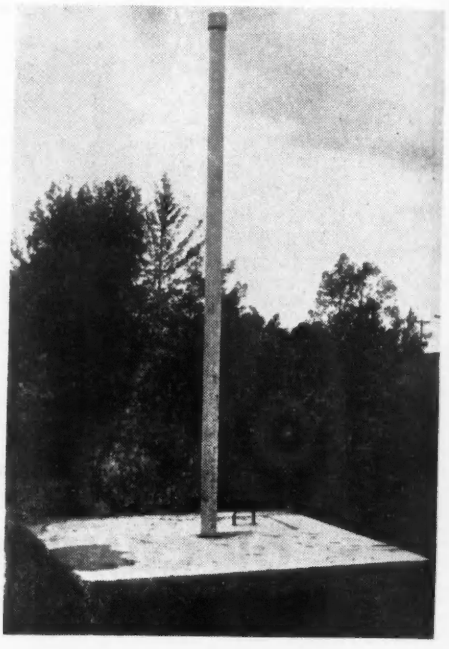
How To—Safely Vent Fumes from Oil Sump

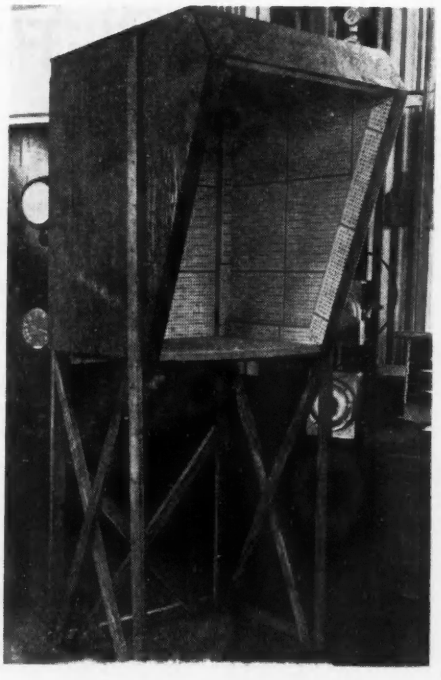


Gas and fumes rising from a sump pit may present a fire and health hazard around a pipe line station. This is especially true when high-voltage crude or finished products are being pumped. One pipe line station uses cast concrete pits to collect waste oil, making the concrete cover tight with two openings. One opening is for the manhole cover, a square slab of concrete made with bevelled edge so it will fit tightly into a corresponding opening in the pit roof. A roll of loosely twisted oakum, laid on the lip of the opening, acts to seal off gas at this point.

The other opening in the pit roof or top is to take a 3-inch pipe collar, which is cast in the concrete. Into this collar is screwed an upright pipe, about ten feet long. A half collar at the top protects the threaded end.

This vent pipe carries gas high enough so it is mixed and made harmless by even a slight breeze. The high pipe also discourages meddling by curious or malicious trespassers. The vent permits ample discharge or intake of air when the pit is being emptied or filled.

How To—Construct Sound-Proof Phone Booth



Where different products are pumped through pipe lines, the station pumper must be notified when to change the stream from one tank to another. Usually these instructions come from the dispatcher and are relayed via telephone. Because time is an important factor in executing such orders, it is necessary that a complete understanding be had when the instructions are made. Due to noises caused by engines and pumps as well as the hiss of fluids passing through manifolds, it is difficult to clearly understand every word spoken over the telephone.

A moveable phone booth was fabricated from scrap material at an extremely low cost to provide a very satisfactory sound-proof compartment in which the station pumper could use in his communications over the telephone at the pump station. This booth consisted of a plywood cabinet lined with perforated Celotex blocks. The cabinet was mounted on four wooden legs and braced. An overhang at the top made it possible for the station pumper to almost enclose himself when talking on the telephone. Back side of the sound-proof booth faced the general direction of the station noises so that they were practically blocked and interferred none whatsoever with the telephone conversation. If the station pumper's desk is moved, the booth may be moved with it since it is not a permanent installation.

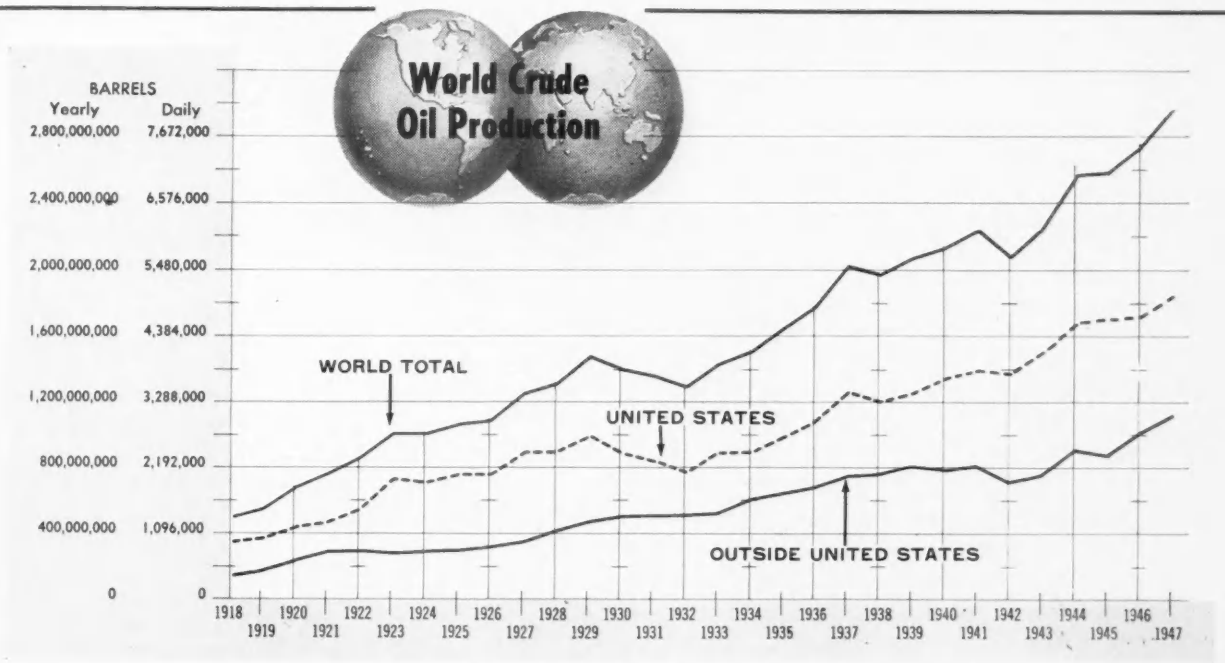
1948 to Bring Another Sharp Gain in World Crude Production

WORLD crude oil production rose sharply to another new all-time peak during 1947, daily average output being 646,658 barrels or 8.6 percent larger than in 1946. A similar increase is in prospect for 1948.

During 1947 the world produced 2,986,257,000 barrels of crude, a gain of 136 million barrels over the previous peak established in 1946. This was equivalent to a daily average of 8,151,526 barrels, which compared with a daily yield of 7,534,767 barrels in the preceding 12 months.

With a similar-sized gain expected in 1948, production in this year should average more than 8,800,000 barrels daily to boost annual output to 3½ billion barrels. Without doubt the gain would be much larger but for the steel shortage.

The increase in world production has been phenomenal in recent years. The 1947 yield was almost 2¾ million barrels per day or 50 percent greater than in 1938, when daily average output was less than 5½ million barrels. The U. S. has been largely responsible for the enlarged producing rate of the world since 1938, contributing 1¾ million barrels of the daily increase while output for the rest



(All Figures in Barrels)

YEAR	WORLD		UNITED STATES		OUTSIDE U.S.A.		YEAR	WORLD		UNITED STATES		OUTSIDE U.S.A.	
	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average		Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average
1918	503,515,000	1,378,000	355,928,000	975,000	147,587,000	403,000	1933	1,442,146,000	3,951,000	905,656,000	2,481,000	536,490,000	1,470,000
1919	555,875,000	1,523,000	378,367,000	1,037,000	177,508,000	486,000	1934	1,522,281,000	4,170,000	908,065,000	2,488,000	614,216,000	1,682,000
1920	688,884,000	1,887,000	442,929,000	1,213,000	245,955,000	674,000	1935	1,654,488,000	4,532,000	996,596,000	2,730,000	657,892,000	1,802,000
1921	766,002,000	2,098,000	472,183,000	1,294,000	293,819,000	804,000	1936	1,791,540,000	4,908,000	1,099,687,000	3,013,000	691,853,000	1,895,000
1922	858,898,000	2,353,000	557,531,000	1,528,000	301,367,000	825,000	1937	2,039,231,000	5,587,000	1,279,160,000	3,505,000	760,071,000	2,082,000
1923	1,015,736,000	2,783,000	732,407,000	2,007,000	283,329,000	776,000	1938	1,988,041,000	5,446,000	1,214,355,000	3,327,000	773,686,000	2,119,000
1924	1,014,318,000	2,779,000	713,940,000	1,956,000	300,378,000	823,000	1939	2,086,160,000	5,715,500	1,264,962,000	3,465,600	821,198,000	2,249,900
1925	1,068,933,000	2,928,000	763,743,000	2,092,000	305,190,000	836,000	1940	2,149,821,000	5,873,800	1,353,214,000	3,697,300	796,607,000	2,176,500
1926	1,096,823,000	3,005,000	770,874,000	2,112,000	325,949,000	893,000	1941	2,220,657,000	6,084,000	1,402,228,000	3,841,700	818,429,000	2,242,300
1927	1,262,582,000	3,459,000	901,129,000	2,469,000	361,453,000	990,000	1942	2,093,083,000	5,734,500	1,386,645,000	3,799,100	706,438,000	1,935,400
1928	1,324,774,000	3,629,000	901,474,000	2,469,000	423,300,000	1,160,000	1943	2,256,652,000	6,182,600	1,505,613,000	4,125,000	751,039,000	2,057,600
1929	1,485,867,000	4,071,000	1,007,323,000	2,760,000	478,544,000	1,311,000	1944	2,590,950,000	7,079,100	1,677,904,000	4,584,400	913,046,000	2,494,700
1930	1,410,037,000	3,863,000	898,011,000	2,460,000	512,026,000	1,403,000	1945	2,594,407,000	7,107,900	1,713,655,000	4,694,900	880,752,000	2,143,000
1931	1,372,532,000	3,760,000	851,081,000	2,332,000	521,451,000	1,428,000	1946	2,750,190,000	7,534,700	1,733,424,000	4,749,100	1,016,766,000	2,785,600
1932	1,309,677,000	3,588,000	785,159,000	2,151,000	524,518,000	1,437,000	1947	2,986,257,000	8,181,500	1,853,166,000	5,077,200	1,133,091,000	3,104,300

of the world was growing by 1 million barrels.

Last year the world's increase was evenly divided between the U. S. and the rest of the world. U. S. daily production in 1947 was 328,100 barrels larger than in 1946, and output for all countries was up 318,700 barrels per day. During the year, the U. S. produced 5,077,200 barrels daily and the remainder of the world recovered 3,104,300 barrels.

The increase anticipuated for 1948 probably will be about evenly divided between the U. S. and the rest of the world also. However, subsequent years undoubtedly will see production growing much more rapidly outside of the U. S. Within five years the U. S., despite future growth, is likely to be producing only half of the world's crude total, so great is the increase expected in the Middle East when pipe can be made available for the installation of pipe lines.

The sharp advance in global crude output was attained largely through production records set in the U. S., Venezuela and the Middle East. The collective yield of these countries constituted 85 percent of the world's production last year. Their 1947 daily production was 1,045,049 barrels more than in 1946, although the world as a whole was reflecting a gain of but 646,758 barrels daily. These are the countries which will contribute most to the enlarged output anticipated during 1948.

Big Gain in Middle East

The Middle East the past year continued the sharp increase that began in 1941. It came through in 1947 with an increase of 121,318 barrels daily to boost its output to 823,317 barrels per day. The latter figure compared with 701,800 barrels in 1946, with 532,000 barrels in 1945, and with only 104,200 barrels as recently as 1941.

Saudi Arabia, which succeeded in upping its production by almost 80,000 barrels per day in producing an average of 244,052 barrels per day during the year, contributed the greater share of the Middle East gain.

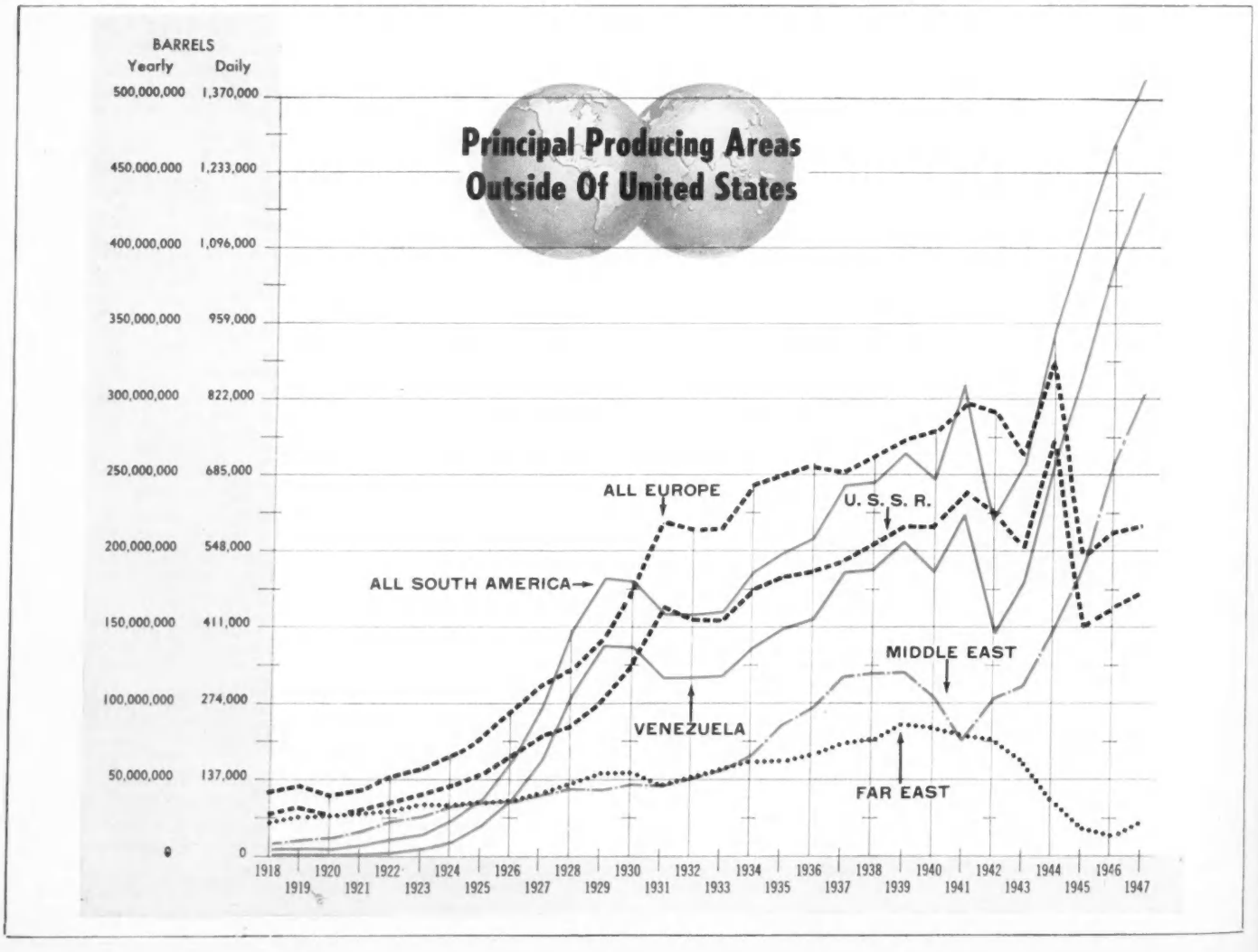
Kuwait, which produced for only half of 1946, had completely rehabilitated its wells in time to produce three times as much oil in 1947. Kuwait's daily average yield in 1947 was 48,904 barrels in contrast with only 16,249 in 1946.

Iran, where Anglo-Iranian Oil Company has maintained a policy of holding production to the capacity of the Abadan refinery, enlarged its production by 16,630 barrels daily. Its daily producing rate was 418,312 barrels.

Iraq, where production is entirely from the Kirkuk field, supplied 87,217 barrels per day in 1947, slightly under the pace maintained during 1946.

Saudi Arabia, Kuwait and Iran are all scheduled to have additional transportation facilities in operation during 1948, and therefore will yield somewhat enlarged quantities of crude oil.

However, the big production increase foreseen for the Middle East is still several years away. It hinges on the completion of pipe line outlets to the Mediterranean Sea. An increase of more than 1 million barrels daily in producing rates is expected from the Middle East countries when pipe lines definitely planned or under way are completed. Shortages of steel, and now political disturbances in the Arab states, postpone realization of this new supply. Those nearest to completion are the Iraq line and the Trans-Arabian Pipe Line from Saudi Arabia, both of which are under construction and which together will have a capacity of around 400,000 barrels daily. Iraq Petroleum Company was expected to have its new 16-inch line to Haifa completed either late in 1947 or early in 1948, but this project has been



further delayed by political disorders. The Trans-Arabian line, originally scheduled for completion in 1949, has encountered the same difficulties, and now cannot be placed in operation before sometime in 1950.

Venezuela, the principal producing source of South America and second only to the U. S., continued throughout 1947 the increase started at the beginning of 1946. The country produced 1,192,427 barrels per day in 1947, a gain of 128,082 barrels over its 1946 yield. There seems little reason to doubt that a similar increase will be recorded in 1948, for it was producing close to 1¼ million barrels daily at the end of 1947.

Other South American countries recorded comparatively small increases, the largest being a 9000-barrel per day gain in Colombia, which averaged 60,241 barrels daily in 1947.

South America's production increased to 1,418,844 barrels per day, and thus accounted for 17 percent of the world's production.

The little reliable information from behind the Soviet iron curtain indicated a steady but not large increase in production. It is estimated that the USSR produced 471,233 barrels per day last year, which compared with 449,315 barrels daily in 1946.

Although of extreme economic importance to the country itself, the discovery and rapid development of the Leduc field in Canada failed to halt the decline in production. Consequently, Canada's 1947 production was 20,644 barrels daily in contrast with 21,008 in 1946.

The European countries, almost without exception, showed the effect of wartime drains on reserves and the difficulties being experienced in getting enough equipment to conduct extensive development work. Roumania, the greatest single European oil source outside of Russia, declined more than 7000 barrels daily and produced only 78,323 barrels per day.

Trends in World Crude Oil Production, By Countries, and Cumulative Production Through 1947

(Sources: U. S. Bureau of Mines except 1947 from private sources or estimated by WORLD OIL.)

	ANNUAL PRODUCTION (Thousands of Barrels)			DAILY AVERAGE PRODUCTION (Actual Barrels)				YEAR'S PRODUCTION AS PERCENT OF WORLD			CUMULATIVE PRODUCTION TO JANUARY 1, 1948 (Thousands of Bbls.)	
Continent and Country	1938	1946	1947	1938	1946	1947	% Diff. '46-'47	1938	1946	1947	Total	As % of World
NORTH AMERICA—												
Canada	6,966	7,668	7,535	19,085	21,008	20,644	— 1.7	0.35	0.28	0.25	128,768	0.23
Mexico	38,506	49,235	57,000	105,496	134,890	156,164	+ 15.8	1.94	1.79	1.91	2,291,209	4.18
United States	1,214,355	1,733,424	1,853,166	3,327,000	4,749,107	5,077,167	+ 6.9	61.08	63.02	62.06	35,079,053	63.91
Other North America	78	150	275	214	411	753	+ 83.2	0.01	0.01	0.01	1,700	.....
Total North America	1,259,905	1,790,477	1,917,976	3,451,795	4,905,416	5,254,728	+ 7.1	63.38	65.10	64.23	37,500,730	68.32
SOUTH AMERICA—												
Argentina	17,076	20,604	21,551	46,784	56,449	59,044	+ 4.6	0.86	0.75	0.72	388,199	0.71
Bolivia	226	363	380	619	995	1,041	+ 4.6	0.01	0.01	0.01	3,832	0.01
Brazil	.....	67	94	.....	184	258	+ 40.2	.....	.....	.....	384	0.00
Colombia	21,582	22,118	25,273	59,129	60,597	69,241	+ 14.3	1.09	0.80	0.85	417,920	0.76
Ecuador	2,246	2,323	2,281	6,153	6,364	6,249	— 1.8	0.11	0.09	0.08	41,217	0.07
Peru	15,839	12,456	12,803	43,395	34,126	35,077	+ 2.8	0.80	0.45	0.43	357,642	0.65
Trinidad	17,737	20,233	20,260	48,594	55,433	55,507	+ 0.1	0.89	0.74	0.68	351,476	0.64
Venezuela	188,174	388,486	435,236	515,545	1,064,345	1,192,427	+ 12.0	9.46	14.13	14.57	4,031,963	7.35
Total South America	262,880	466,650	517,878	720,219	1,278,493	1,418,844	+11.00	13.22	16.97	17.34	5,592,633	10.19
EUROPE—												
Albania	752	365	350	2,060	1,000	959	— 4.1	0.04	0.01	0.01	9,389	0.02
Austria	383	5,734	5,692	1,049	15,710	15,595	— 0.7	0.02	0.21	0.19	45,079	0.08
Czechoslovakia	130	156	154	356	427	422	— 1.2	0.01	0.01	0.01	3,920	0.01
England	.....	412	376	.....	1,129	1,030	— 8.8	.....	0.02	0.01	3,834	0.01
France	513	367	379	1,406	1,006	1,039	+ 3.3	0.02	0.01	0.01	13,640	0.02
Germany	3,861	4,500	4,064	10,578	12,329	11,134	— 9.7	0.19	0.16	0.14	87,064	0.16
Hungary	288	5,146	4,521	789	14,099	12,386	— 12.1	0.01	0.19	0.15	38,744	0.07
Italy	101	76	78	277	208	214	+ 2.9	0.01	.....	.....	3,370	0.01
Netherlands	.....	10	1,315	.....	27	3,603	+.....	.....	.....	0.05	1,380	.....
Poland	3,763	860	944	10,310	2,356	2,586	+ 9.8	0.19	0.03	0.03	276,436	0.50
Roumania	48,487	31,206	28,588	132,841	85,496	78,323	— 8.4	2.44	1.14	0.96	1,157,694	2.11
U.S.S.R. (Russia)	204,956	164,000	172,000	561,523	449,315	471,233	+ 4.9	10.31	5.96	5.76	5,831,712	10.62
Other Europe	9	10	10	25	27	27	.....	.....	.....	.....	106	0.00
Total Europe	263,243	212,842	218,471	721,214	583,129	598,551	+ 2.64	13.24	7.74	7.32	7,472,368	13.61
AFRICA—												
Egypt	1,581	9,070	9,627	4,331	24,849	26,376	+ 6.1	0.08	0.33	0.32	108,107	0.20
Other Africa	27	20	22	74	55	60	+ 9.1	0.00	.....	.....	430	.....
Total Africa	1,608	9,090	9,649	4,405	24,904	26,436	+ 6.2	0.08	0.33	0.32	108,537	0.20
ASIA, Middle East—												
Bahrein	8,298	8,010	8,998	22,734	21,945	24,652	+ 12.3	0.42	0.29	0.30	87,587	0.16
Iran	78,372	146,614	152,684	214,718	401,682	418,312	+ 4.1	3.94	5.33	5.11	1,745,763	3.18
Iraq	32,643	35,665	31,834	89,433	97,713	87,217	— 10.7	1.64	1.30	1.07	381,121	0.69
Kuwait	.....	5,931	17,850	.....	16,249	48,904	+201.0	.....	0.21	0.60	23,781	0.04
Saudi Arabia	495	59,944	89,079	1,356	164,230	244,052	+ 48.6	0.03	2.18	2.98	201,425	0.37
Total Middle East	119,808	256,164	300,445	328,241	701,819	823,137	+ 17.3	6.03	9.31	10.06	2,439,677	4.44
ASIA, Far East—												
Borneo, British (Sarawak & Brunei)	6,913	2,100	3,710	18,940	5,753	10,164	+ 76.7	0.35	0.08	0.12	129,442	0.24
Burma	7,538	700	810	20,652	1,918	2,219	+ 15.7	0.38	0.03	0.03	335,121	0.61
India	2,488	2,193	2,168	6,816	6,008	5,940	— 1.1	0.12	0.08	0.07		
China	.....	513	548	.....	1,405	1,501	+ 6.8	.....	0.02	0.02	2,938	0.01
Formosa (Taiwan)	.....	16	18	.....	44	49	+ 11.4	.....	.....	.....	*233	.....
Japan	2,511	1,343	1,300	6,879	3,680	3,562	— 3.2	0.13	0.05	0.04	*93,912	0.17
Netherlands Indes	57,318	2,100	6,483	157,036	5,753	17,762	+208.7	2.88	0.08	0.22	1,141,128	2.08
Sakhalin	3,821	6,000	6,800	10,469	16,439	18,630	+ 13.3	0.19	0.21	0.23	73,040	0.13
Total Far East	80,589	14,965	21,837	220,792	41,000	59,827	+ 45.9	4.05	0.55	0.73	1,775,814	3.24
Asia, Total	200,397	271,129	322,282	549,033	742,819	882,964	+ 18.9	10.08	9.86	10.79	4,215,491	7.68
AUSTRALIA-NEW ZEALAND	4	2	1	11	6	3	— 50.0	.....	.....	.....	39	0.00
World, Undistributed	4	.....	.....	11	.....	.....	.....	.....	.....	.....	1,044	0.00
Total World	1,988,041	2,750,190	2,986,257	5,446,688	7,534,767	8,181,526	+ 8.6	100.00	100.00	100.00	54,890,842	100.00

* Formosa included with Japan prior to 1941.

World Crude Oil Production, By Countries, By Years (Part 1)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources and Minerals Yearbook*, except as otherwise indicated)

YEAR	World Total	Percent Produced by U.S.	NORTH AMERICA					SOUTH AMERICA									
			Canada	Mexico	United States	Other North America	Total North America	Argentina	Bolivia	Brazil	Chile	Colombia	Ecuador	Peru	Trinidad	Venezuela	Total South America
1857	2	....															
1858	4	....															
1859	6	31			2		2										
1860	509	98			500		500										
1861	2,131	99			2,114		2,114										
1862	3,092	99	12		3,057		3,069										
1863	2,763	94	83		2,611		2,694										
1864	2,304	92	90		2,116		2,206										
1865	2,716	92	110		2,498		2,608										
1866	3,899	92	175		3,598		3,773										
1867	3,709	90	190		3,347		3,537										
1868	3,990	91	200		3,646		3,846										
1869	4,696	90	220		4,215		4,435										
1870	5,799	91	250		5,261		5,511										
1871	5,730	91	270		5,205		5,475										
1872	6,877	92	308		6,293		6,601										
1873	10,838	91	365		9,894		10,259										
1874	11,933	92	169		10,927		11,096										
1875	9,977	88	220		8,788		9,008										
1876	11,051	83	312		9,133		9,445										
1877	15,754	85	312		13,350		13,662										
1878	18,417	84	312		15,397		15,709										
1879	23,601	84	575		19,914		20,489										
1880	30,018	88	350		26,286		26,636										
1881	31,993	86	275		27,661		27,936										
1882	35,704	85	275		30,350		30,625										
1883	30,255	78	250		23,450		23,700										
1884	35,969	67	250		24,218		24,468										
1885	36,765	59	250		21,859		22,109										
1886	47,243	59	584		28,065		28,649										
1887	47,807	59	526		28,283		28,809										
1888	52,165	53	695		27,612		28,307										
1889	61,507	57	705		35,164		35,869										
1890	76,633	60	795		45,824		46,619										
1891	91,100	60	755		54,293		55,048										
1892	88,739	57	780		50,515		51,295										
1893	92,038	53	798		48,431		49,229										
1894	89,337	55	829		49,344		50,173										
1895	103,692	51	726		52,892		53,618										
1896	114,199	53	727		60,960		61,687							47			47
1897	121,993	50	710		60,476		61,186							71			71
1898	124,979	44	758		55,364		56,122							71			71
1899	131,147	44	808		57,071		57,879							89			89
1900	149,137	43	913		63,621		64,534							274			274
1901	167,440	41	757	10	69,389		70,156							275			275
1902	181,809	49	531	40	88,767		89,338							287			287
1903	194,879	52	487	75	100,461		101,023							278			278
1904	217,948	54	553	126	117,081		117,760							290			290
1905	215,091	63	634	251	134,717		135,602							373			373
1906	213,263	59	569	502	126,494		127,565							531			531
1907	263,957	63	789	1,005	166,095		167,889	*						751			751
1908	285,287	63	528	3,933	178,527		182,988	12						945	*		957
1909	298,709	61	421	2,714	183,171		186,306	18						1,411	57		1,486
1910	327,763	64	316	3,634	209,557		213,507	20						1,258	143		1,421
1911	344,361	64	291	12,553	220,449		233,293	13						1,465	285		1,763
1912	352,443	63	243	16,558	222,935		239,736	47						1,752	437		2,236
1913	385,345	64	228	25,696	248,446		274,370	131						2,071	504		2,706
1914	407,544	65	215	26,235	265,763		292,213	276						1,837	644		2,757
1915	432,033	65	215	32,911	281,104		314,230	513						2,579	750		3,842
1916	457,500	66	198	40,546	300,767		341,511	867						2,593	929		4,389
1917	502,891	67	214	55,293	335,316		390,823	1,218					57	2,577	1,602	120	5,574
1918	503,515	71	305	63,828	355,928		420,061	1,353					†60	2,527	2,082	333	6,355
1919	555,875	68	241	87,073	378,367		465,681	1,331					†60	2,628	1,841	425	6,285
1920	688,884	64	196	157,069	442,929		600,194	1,651					†60	2,817	2,083	457	7,068
1921	766,002	62	188	193,398	472,183		665,769	2,036				67	†60	3,699	2,354	1,433	9,649
1922	858,898	65	179	182,278	557,531		739,988	2,866				323	†60	5,314	2,445	2,201	13,209
1923	1,015,736	72	170	149,585	732,407		882,162	3,400				425	87	5,699	3,051	4,201	16,863
1924	1,014,318	70	161	139,678	713,940		853,779	4,639				445	†100	8,379	4,057	9,042	26,662
1925	1,068,933	71	332	115,515	763,743		879,590	6,336				1,007	160	9,232	4,387	19,687	40,809
1926	1,096,823	70	364	90,421	770,874		861,659	7,851				6,444	214	10,762	4,971	36,911	67,153
1927	1,262,582	71	477	64,121	901,129		965,727	8,630				15,014	537	10,127	5,380	63,134	102,822
1928	1,324,774	68	624	50,151	901,474		952,249	9,070				19,897	1,084	12,006	7,684	105,749	155,490
1929	1,485,867	68	1,117	44,688	1,007,323		1,053,128	9,391	*			20,385	1,381	13,422	8,716	137,472	190,767
1930	1,410,037	64	1,522	39,530	898,011		939,063	9,002	56			20,346	1,553	12,449	9,419	136,669	189,494
1931	1,372,532	62	1,543	33,039	851,081		885,663	11,709	25			18,237	1,762	10,089	9,744	116,613	168,179
1932	1,309,677	60	1,044	32,805	785,159		819,008	13,139	44			16,414	1,597	9,899	10,126	116,541	167,760
1933	1,442,146	63	1,145	34,001	905,656	23	940,825	13,691	112			13,158	1,620	13,257	9,561	117,720	169,119
1934	1,522,281	60	1,417	38,172	908,065	28	947,682	14,024	159			17,341	1,637	16,314	10,894	136,103	196,472
1935	1,654,488	60	1,447	40,241	996,596	47	1,038,331	14,297	164			17,598	1,732	17,067	11,671	148,254	210,783
1936	1,791,540	61	1,500	41,028	1,099,687	62	1,142,277	15,458	105			18,756	1,942	17,593	13,237	154,794	221,885
1937	2,039,231	63	2,944	46,907	1,279,160	33	1,329,044	16,355	122			20,599	2,161	17,457	15,503	186,230	258,427
1938	1,988,041	61	6,966	38,506	1,214,355	78	1,259,905	17,076	226			21,582	2,246	15,839	17,737	188,174	262,880
1939	2,086,160	60.6	7,838	42,898	1,264,962	112	1,315,810	18,613	215			23,857	2,313	13,508	19,270	206,470	284,246
1940	2,149,821	62.9	8,591	44,036	1,353,214	142	1,405,983	20,609	288	2		25,593	2,349	12,126	22,227	185,570	268,764
1941	2,220,657	63.1	10,134	42,196	1,402,228	150	1,454,708	21,873	235	3		24,553	1,557	11,935	20,506	228,430	309,092
1942	2,093,083	66.2	10,365	34,815	1,386,645	150	1,431,975	23,704	308	33		10,487	2,278	13,629	22,069	147,675	220,183
1943	2,256,652	66.7	10,052	35,163	1,505,613	150	1,550,978	27,714	334	48		3,261	2,315	14,654	21,385	177,631	257,342
1944	2,590,954	64.8	10,099	38,203	1,677,904	150	1,726,356	24,230	314	58		22,291	2,967	14,386	22,139	257,046	343,431
1945	2,594,407	66.1	8,483	43,547	1,713,655	150	1,765,835	22,881	382	79		22,449	2,664	13,744	21,093	323,156	406,448
1946	2,750,190	63.0	7,668	49,235	1,733,424	150	1,790,477	20,604	363	67		22,118	2,323	12,456	20,233	388,486	466,650
1947‡	2,986,257	62.1	7,535	57,000	1,853,166	275	1,917,976	21,551	380	94		25,273	2,281	12,803	20,260	435,236	517,878
Total	54,890,842	63.9	128,768	2,291,209	35,079,053	1,700	37,500,730	388,199	3,832	384		417,920	41,217	357,642	351,476	4,031,963	5,592,633

* Less than 1,000 barrels. † Approximate production. ‡ Estimated by WORLD OIL.

One more chapter

. . . . in the story of an exacting job well handled!

The exacting job we refer to is making the kind of pressure gauges needed by industry in general and the petroleum industry in particular. We have made this *our* job, and we have handled it so well that the resulting preference accorded Marsh instruments has built a volume of business which called for this new, modern plant at the North edge of Chicago, in Skokie, Illinois.

We have built this plant on the bed rock foundation of more than 80 years of instrument making, but we have taken full advantage of the opportunity of building anew. Thus, we have put into it every available tool of production to expedite and amplify the methods and facilities and craftsmanship which have made Marsh instruments "The Standard of Accuracy."

There are new facilities here for carrying out the many extra steps that have contributed so much extra value to all Marsh instruments—new facilities for the testing of materials, for the gauging of component parts, for the final testing of every Marsh product.

Yes, the finest of pressure gauges are being made still better in the new Marsh plant. Insist on Marsh accuracy and stamina when you select pressure gauges—or equipment requiring gauges.

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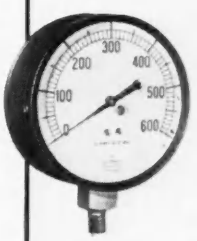
★ Beyond our new plant, the Marsh branch plant at Houston offers shipment from stock and facilities for repairing all makes of gauges.

Your kind of gauges

Because the petroleum industry is the greatest proving ground for gauge accuracy and stamina, we have met its challenge with these gauges that represent the best of all we have learned. Ask your supplier for new bulletin, Marsh Gauges for the Oil Industry.

Mastergauge — Guaranteed accurate within ½ of 1% of reading — the all-purpose gauge for toughest service.



Oil Country Boiler Gauge — The Mastergauge made especially for use on oil country boilers.

Christmas Tree Gauge — Specially made for Christmas trees — ruggedness and durability beyond all others.

Mud Pump Gauge— The Mastergauge with protecting diaphragm.

MARSH GAUGES

World Crude Oil Production, By Countries, By Years (Part 2)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources and Minerals Yearbook*, except as otherwise indicated)

	EUROPE														AFRICA			
YEAR	Albania	Austria	Czecho-slovakia	Great Britian	France	Ger-many	Hun-gary	Italy	Nether-lands	Poland	Rou-mania	‡U.S.S.R. (Russia)	Other Europe	‡Total Europe	Egypt	Algeria	Other Africa	Total Africa
1857											2			2				
1858											4			4				
1859											4			4				
1860											9			9				
1861								*			17			17				
1862								*			23			23				
1863								*			28	41		69				
1864								*			33	65		98				
1865								2			39	67		108				
1866								1			42	83		126				
1867								1			51	120		172				
1868								*			56	88		144				
1869								*			59	202		261				
1870								*			84	204		288				
1871								*			90	165		255				
1872								*			91	185		276				
1873								*			104	475		579				
1874								1		150	103	583		837				
1875								1		158	108	697		964				
1876								3		164	111	1,321		1,599				
1877								3		170	108	1,801		2,082				
1878								4		176	109	2,401		2,690				
1879								3		215	110	2,761		3,089				
1880						9		2		229	115	3,001		3,356				
1881						29		1		287	122	3,601		4,040				
1882						58		2		330	136	4,538		5,064				
1883						27		2		365	139	6,002		6,535				
1884						46		3		408	211	10,805		11,473				
1885						41		2		465	193	13,925		14,626				
1886						74		2		306	168	18,006		18,556				
1887						74		1		344	182	18,368		18,969				
1888						85		1		467	219	23,049		23,821				
1889						68		1		515	298	24,609		25,491				
1890						108		3		659	383	28,691		29,844				
1891						109		8		631	488	34,573		35,809				
1892						101		18		646	593	35,775		37,133				
1893						100		19		693	535	40,457		41,804				
1894						123		21		949	508	36,375		37,976				
1895						121		26		1,453	576	46,140		48,316				
1896						145		18		2,444	543	47,221		50,371				
1897						166		14		2,226	571	54,399		57,376				
1898						184		15		2,376	776	61,610		64,961				
1899						192		16		2,314	1,426	65,955		69,903				
1900						358		12		2,347	1,629	75,780		80,126				
1901						314		16		3,251	1,678	85,168		90,427				
1902						354		19		4,142	2,060	80,540		87,115				
1903						446		18		5,235	2,763	75,591		84,053				
1904						637		26		5,947	3,599	78,537		88,746				
1905						561		44		5,766	4,421	54,960		65,752				
1906						579		54		5,468	6,378	58,897		71,376				
1907						757		60		8,456	8,118	61,851		79,242				
1908						1,009		51		12,612	8,252	62,187		84,111				
1909						1,019		42		14,933	9,327	65,970		91,291				
1910						1,032		51		12,673	9,724	70,337		93,817				
1911						1,017		75		10,519	11,108	66,184		88,903	21			21
1912						1,031		54		8,535	12,976	68,019		90,615	214			214
1913						857		47		7,818	13,555	62,834		85,111	98			98
1914						781		40		6,436	12,827	67,020		87,104	753	1		754
1915						703		44		5,352	12,030	68,548		86,677	212	4		216
1916						656		51		6,587	8,945	65,817		82,056	404	8		412
1917					§	642		41		6,228	3,721	63,072		73,704	943	9		952
1918					363	270		35		6,032	8,730	27,168		42,598	1,935	7		1,942
1919			48	2	334	265		35		6,096	6,618	31,752		45,150	1,517	5		1,522
1920			69	3	356	246		35		5,607	7,435	25,430		39,181	1,042	4		1,046
1921			94	3	389	274		32		5,167	8,368	28,968		43,295	1,255	3		1,258
1922			120	1	496	319		31		5,227	9,843	35,692		51,729	1,188	9		1,197
1923			74	1	494	346		34		5,402	10,867	39,147		56,365	1,054	9		1,063
1924			76	2	497	406		39		5,657	13,369	45,355		65,401	1,122	11		1,133
1925			158	3	459	541		61		5,960	16,650	52,448		76,280	1,226	12		1,238
1926			150	2	478	653		41		5,844	23,314	64,311		94,793	1,188	9		1,197
1927			112	2	504	663		47		5,342	26,868	77,018		110,056	1,267	8		1,275
1928			94	1	512	630		46		5,492	30,773	†84,745		122,293	1,842	8		1,850
1929			93		535	704		45		4,988	34,758	†99,507		140,630	1,868	20		1,888
1930			157	*	523	1,182		59		4,904	41,624	†125,555		174,004	1,996	16		2,012
1931			134	★	520	1,606		124		4,662	49,127	162,842		219,015	2,038	★		2,038
1932			126	★	530	1,608		208		4,116	53,815	154,367		214,770	1,895	★		1,895
1933	11		122	★	562	1,665		204		4,072	54,020	154,840		215,496	1,663	★		1,663
1934	10		178	★	557	2,187		151		3,913	62,063	174,318		243,377	1,546	★		1,546
1935	41	44	133	★	541	2,996		119		3,812	61,310	182,386	2	251,384	1,301	★	4	1,305
1936	273	50	127	★	503	3,115		123		3,789	63,659	186,206	1	257,846	1,278	★	4	1,282
1937	619	221	123	★	502	3,176	16	110		3,716	52,452	193,241	4	254,180	1,196	★	22	1,218
1938	752	383	130	★	513	3,861	288	101		3,763	48,487	204,956	9	263,243	1,581	★	27	1,608
1939	934	1,240	120		500	4,487	1,103	91		3,898	45,648	216,866	10	274,897	4,666	★	27	4,693
1940	1,497	2,808	163	124	496	7,371	1,881	85		3,891	43,168	218,600	10	280,094	6,505	★	27	6,532
1941	1,334	4,238	183	223	414	6,303	3,183	95		1,793	40,517	238,150	10	296,443	8,546	★	27	8,573
1942	1,601	5,899	271	605	463	5,191	5,037	101		2,794	42,094	227,470	10	291,536	8,275	★	27	8,302
1943	1,001	7,478	200	839	356	4,973	6,347	75		3,500	39,182	200,750	10	264,711	8,953	★	25	8,978
1944	334	8,218	185	703	300	5,049	6,204	75	14	3,000	26,191	275,000	10	325,283	9,416	★	30	9,446
1945	267	3,074	170	532	197	3,800	5,018	75	41	750	34,772	148,953	10	197,659	9,406	★	25	9,431
1946	365	5,734	156	412	367	4,500	5,146	76	10	860	31,206	164,000	10	212,842	9,070	★	20	9,090
1947I	350	5,692	154	376	379	4,064	4,521	78	1,315	944	28,588	172,000	10	218,471	9,627	★	22	9,649
Total	9,389	45,079	3,920	3,834	13,640	87,064	38,744	3,370	1,380	276,436	1,157,694	5,831,712	106	7,472,368	108,107	143	287	108,537

‡ Includes fields in Russian Asia other than Sakhalin. * Less than 1,000 barrels. ★ No more data available. § France's earlier production credited to Germany. † Year ended September 30. I Estimated by WORLD OIL.

Here is the LANE·WELLS PACKER for the TOUGHEST TESTING JOBS

Not for the ordinary, everyday jobs of production, but for the tough ones where operating and well conditions combine to give equipment real punishment — these are the jobs for which the Lane-Wells BOE Packer was made to order. Designed and engineered to stand up under extreme stresses which would cripple lesser equipment, all stress-bearing parts are made — thicker in cross-section, of highest grade alloy steels, heat-treated to exacting specifications. The six-ring Floseal packing ring assembly gives positive, leak-proof pack off in casing under 7,000 lbs. p. s. i. differential pressures at temperatures up to 300° F., and the Flopak valve assembly seals completely, under the same conditions — even with obstructions on the valve seat! Under the toughest conditions, the BOE runs easily, and like all Lane-Well Packers, can be easily set and reset many times. So, when "heavy-duty" isn't heavy enough, run the *extra* heavy-duty packer — the Lane-Wells BOE.

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LANE WELLS COMPANY

LOS ANGELES • HOUSTON • OKLAHOMA CITY

24-HOUR SERVICE *General Offices, Export Offices and Plant* 45 BRANCHES

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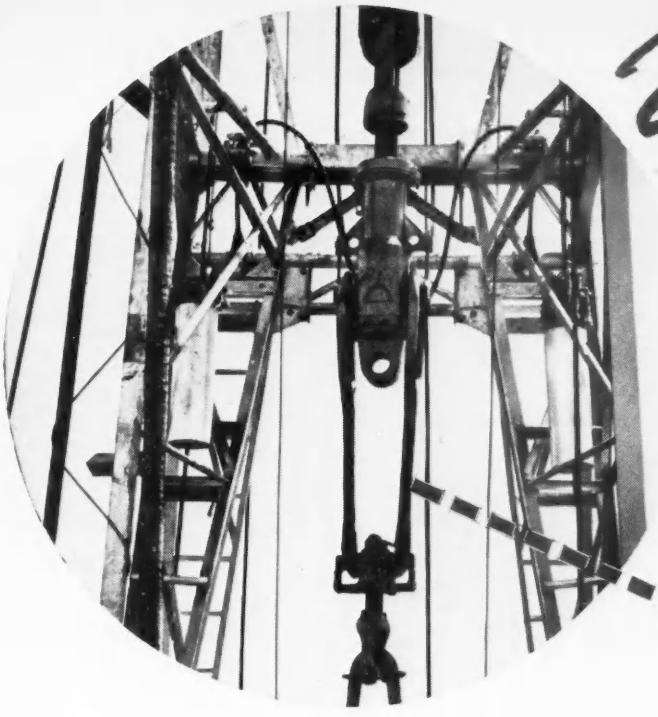
World Crude Oil Production, By Countries, By Years (Part 3)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources and Minerals Yearbook*, except as otherwise indicated)

	ASIA—Middle East						ASIA—Far East												
Year	Bahrein	Iran	Iraq	Kuwait	Saudi Arabia	Total Middle East	British Borneo	‡India	‡ Burma	China	¶ Formosa (Taiwan)	Japan	Netherland India	Sakhalin	Total Far East	*Total Asia	Australia-New Zealand	Rest of World
1857	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1858	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1859	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1860	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1861	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1862	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1863	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1864	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1865	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1866	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1867	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1868	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1869	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1870	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1871	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1872	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1873	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1874	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1875	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	.....	5	5	.....	.....
1876	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	.....	.....	7	7	.....	.....
1877	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	.....	.....	10	10	.....	.....
1878	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18	.....	.....	18	18	.....	.....
1879	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23	.....	.....	23	23	.....	.....
1880	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	26	.....	.....	26	26	.....	.....
1881	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17	.....	.....	17	17	.....	.....
1882	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15	.....	.....	15	15	.....	.....
1883	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	.....	.....	20	20	.....	.....
1884	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	28	.....	.....	28	28	.....	.....
1885	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30	.....	.....	30	30	.....	.....
1886	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	38	.....	.....	38	38	.....	.....
1887	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29	.....	.....	29	29	.....	.....
1888	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	37	.....	.....	37	37	.....	.....
1889	.....	.....	.....	.....	.....	.....	.....	.....	94	.....	.....	53	.....	.....	147	147	.....	.....
1890	.....	.....	.....	.....	.....	.....	.....	.....	118	.....	.....	52	.....	.....	170	170	.....	.....
1891	.....	.....	.....	.....	.....	.....	.....	.....	190	.....	.....	53	.....	.....	243	243	.....	.....
1892	.....	.....	.....	.....	.....	.....	.....	.....	242	.....	.....	69	.....	.....	311	311	.....	.....
1893	.....	.....	.....	.....	.....	.....	.....	.....	299	.....	.....	106	600	.....	1,005	1,005	.....	.....
1894	.....	.....	.....	.....	.....	.....	.....	.....	327	.....	.....	173	688	.....	1,188	1,188	.....	.....
1895	.....	.....	.....	.....	.....	.....	.....	.....	372	.....	.....	170	1,216	.....	1,758	1,758	.....	.....
1896	.....	.....	.....	.....	.....	.....	.....	.....	430	.....	.....	237	1,427	.....	2,094	2,094	.....	.....
1897	.....	.....	.....	.....	.....	.....	.....	.....	546	.....	.....	262	2,552	.....	3,360	3,360	.....	.....
1898	.....	.....	.....	.....	.....	.....	.....	.....	542	.....	.....	319	2,964	.....	3,825	3,825	.....	.....
1899	.....	.....	.....	.....	.....	.....	.....	.....	941	.....	.....	539	1,796	.....	3,276	3,276	.....	.....
1900	.....	.....	.....	.....	.....	.....	.....	.....	1,079	.....	.....	871	2,253	.....	4,203	4,203	.....	.....
1901	.....	.....	.....	.....	.....	.....	.....	.....	1,431	.....	.....	1,117	4,014	.....	6,562	6,562	.....	20
1902	.....	.....	.....	.....	.....	.....	.....	.....	1,617	.....	.....	996	2,430	.....	5,043	5,043	.....	26
1903	.....	.....	.....	.....	.....	.....	.....	.....	2,510	.....	.....	1,200	5,770	.....	9,489	9,489	.....	36
1904	.....	.....	.....	.....	.....	.....	.....	.....	3,385	.....	.....	1,219	6,508	.....	11,112	11,112	.....	40
1905	.....	.....	.....	.....	.....	.....	.....	.....	4,137	.....	.....	1,347	7,850	.....	13,334	13,334	.....	30
1906	.....	.....	.....	.....	.....	.....	.....	.....	4,016	.....	.....	1,564	8,181	.....	13,761	13,761	.....	30
1907	.....	.....	.....	.....	.....	.....	.....	.....	4,344	.....	.....	1,718	9,983	.....	16,045	16,045	.....	30
1908	.....	.....	.....	.....	.....	.....	.....	.....	5,047	.....	.....	1,871	10,283	.....	17,201	17,201	.....	30
1909	.....	.....	.....	.....	.....	.....	.....	.....	6,677	.....	.....	1,887	11,042	.....	19,606	19,606	.....	20
1910	.....	.....	.....	.....	.....	.....	.....	.....	6,138	.....	.....	1,829	11,031	.....	18,998	18,998	.....	20
1911	.....	.....	.....	.....	.....	.....	.....	.....	6,451	.....	.....	1,737	12,173	.....	20,361	20,361	.....	20
1912	.....	.....	.....	.....	.....	.....	.....	.....	7,117	.....	.....	1,659	10,846	.....	19,622	19,622	.....	20
1913	.....	1,857	.....	.....	.....	1,857	141	.....	7,930	.....	.....	1,940	11,172	.....	21,183	23,040	.....	20
1914	.....	2,910	.....	.....	.....	2,910	318	.....	7,410	.....	.....	2,636	11,422	.....	21,786	24,696	.....	20
1915	.....	3,616	.....	.....	.....	3,616	392	.....	8,202	.....	.....	2,928	11,920	.....	23,442	27,058	.....	10
1916	.....	4,477	.....	.....	.....	4,477	629	.....	8,491	.....	.....	2,963	12,547	.....	24,630	29,107	.....	25
1917	.....	7,147	.....	.....	.....	7,147	542	.....	8,079	.....	.....	2,861	13,180	.....	24,662	31,809	.....	29
1918	.....	8,623	.....	.....	.....	8,623	504	.....	8,188	.....	.....	2,441	12,778	.....	23,911	32,534	.....	25
1919	.....	10,139	.....	.....	.....	10,139	596	.....	8,736	.....	.....	2,238	15,508	.....	27,078	37,217	.....	20
1920	.....	12,230	.....	.....	.....	12,230	1,020	.....	8,375	.....	.....	2,221	17,529	.....	29,145	41,375	.....	20
1921	.....	16,673	.....	.....	.....	16,673	1,411	.....	8,734	.....	.....	2,233	16,958	2	29,338	46,011	.....	20
1922	.....	22,247	.....	.....	.....	22,247	2,849	.....	8,529	.....	.....	2,055	17,066	7	30,506	52,753	.....	22
1923	.....	25,230	.....	.....	.....	25,230	3,940	.....	8,406	.....	.....	1,804	19,870	9	34,029	59,259	.....	24
1924	.....	32,373	.....	.....	.....	32,373	4,163	.....	8,416	.....	.....	1,814	20,473	80	34,946	67,319	.....	24
1925	.....	35,038	.....	.....	.....	35,038	4,257	.....	8,274	.....	.....	1,915	21,422	87	35,955	70,993	.....	23
1926	.....	35,842	.....	.....	.....	35,842	4,942	.....	8,011	.....	.....	1,785	21,243	181	36,162	72,004	.....	17
1927	.....	39,688	338	.....	.....	40,026	4,943	.....	8,032	.....	.....	1,789	27,459	440	42,663	82,689	.....	13
1928	.....	43,461	713	.....	.....	44,174	§5,223	.....	8,741	.....	.....	1,944	32,118	677	48,703	92,877	.....	15
1929	.....	42,145	798	.....	.....	42,943	5,290	.....	8,747	.....	.....	2,023	39,279	‡1,134	56,473	99,416	.....	38
1930	.....	45,828	913	.....	.....	46,741	4,907	.....	8,292	.....	.....	1,950	41,729	‡1,805	58,683	105,424	.....	40
1931	.....	44,376	830	.....	.....	45,206	3,854	.....	8,200	.....	.....	2,050	35,539	2,734	52,377	97,583	.....	54
1932	.....	49,471	836	.....	.....	50,307	3,796	.....	8,817	.....	.....	1,630	39,001	2,631	55,875	106,182	.....	62
1933	31	54,392	917	.....	.....	55,340	4,490	.....	8,743	.....	.....	1,455	42,606	2,338	59,632	114,972	.....	71
1934	285	57,851	7,689	.....	.....	65,825	5,140	.....	10,503	.....	.....	1,834	46,925	2,881	67,283	133,108	.....	96
1935	1,265	57,273	27,408	.....	.....	85,946	5,546	2,038	7,181	.....	.....	2,249	47,171	2,545	66,730	152,676	5	4
1936	4,645	62,718	30,406	.....	20	97,789	5,209	1,978	7,588	.....	.....	2,440	50,025	3,212	70,452	168,241	5	4
1937	7,762	77,804	31,836	.....	65	117,467	6,009	2,162	7,848	.....	.....	2,488	56,724	3,656	78,887	196,354	4	4
1938	8,298	78,372	32,643	.....	495	119,808	6,913	2,488	7,538	.....	.....	2,511	57,318	†3,821	80,589	200,397	4	4
1939	7,589	78,151	30,791	.....	3,934	120,465	7,097	2,327	7,873	4	.....	2,654	62,087	4,000	86,042	206,507	3	4
1940	7,074	66,317	24,225	.....	5,075	102,691	7,047	2,302	7,731	10	.....	2,639	62,011	4,000	85,740	188,431	3	14
1941	6,794	50,777	12,650	.....	4,310	74,531	6,864	2,899	7,762	87	62	1,929	53,704	4,000	77,307	151,338	3	.....
1942	6,241	72,256	19,726	.....	4,530	102,753	3,000	2,792	2,500	340	48	1,652	24,000	4,000	38,332	141,085	2	.....
1943	6,572	74,612	24,848	.....	4,868	110,900	4,500	2,735	1,000	447	38	1,727	48,294	5,000	63,741	174,641	2	.....
1944	6,714	102,045	30,943	.....	7,794	147,496	6,000	2,784	750	505	40	1,601	22,260	5,000	38,940	186,436	2	.....
1945	7,309	130,526	35,112	.....	21,311	194,258	2,100	2,343	725	484	11	1,510	7,600	6,000	20,773	215,031	3	.....
1946	8,010	146,614	35,665	5,931	59,944	256,164	2,100	2,193	700	513	16	1,343	2,100	6,000	14,965	271,129	2	.....
1947?	8,998	152,684	31,834	17,850	89,079	300,445	3,710	2,168	810	548	18	1,300	6,483	6,800	21,837	322,282	1	.....
Total	87,587	1,745,763	381,121	23,781	201,425	2,439,677	129,442	‡335,121		2,938	233	93,912	1,141,128	73,040	1,775,814	4,215,491	39	1,044

‡ Separation of British India and Burma prior to 1935 not available from U. S. Bureau of Mines data here used. Data by L. Dudley Stamp in "Petroleum Development and Technology, 1933," and in A.I.M.E. "Transactions" indicate cumulatives through 1934 as follows: Burma 184,528, India 20,756. * Exclusive of U.S.S.R. fields in Asia, other than Sakhalin, which are included with U.S.R. in Europe. ‡ Year ended September 30. † Approximate production. § Beginning of production in Brunei. ¶ Formosa included with Japan prior to 1941. ? Estimated by WORLD OIL.



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World Development Outlook Bright for 1948

This scene is typical of operations throughout Venezuela. Expansion of producing areas call for permanent housing for employes.

By GEORGE O. IVES
International Editor

THROUGHOUT the world, the petroleum industry is working toward expansion of facilities which will enable it to meet all demands fully within as few years as possible. The worldwide expansion now under way is reminiscent of such great undertakings as the railroad building campaign in the U. S. following the Civil War.

Primary handicap confronting the industry in this great expansion program is the scarcity of steel and other materials. It is hoped that 1948 will see a slight easing of the materials situation which will have a direct effect on industry developments throughout the world.

Especially important is the acute shortage of tubular goods. Drilling operations everywhere are being delayed by the lack of drill pipe and casing. Line pipe is needed in very large quantities to construct extensive new pipe lines.

Also important is the need for enlarged refining capacity, both through rehabilitation and modernization of existing plants and through construction of entirely new facilities. Much steel will have to be allocated for the fabrication of these plants before the world's petroleum supply will be sufficient to satisfy demands.

Middle East Expansion

Outside the U. S. the greatest development is due to take place in the Middle East. Huge reserves and wells capable of producing at almost any desired rate make this the logical region from which to expect production in the great quantities now needed. Companies holding interests in the reserves of Iraq, Iran, Kuwait and Saudi Arabia have authorized huge expenditures for building pipe lines and refineries, as well as for additional field development. These programs were designed to swell ultimate production to approximately 2 million barrels daily, making the oil available at Mediterranean ports to cut tanker hauls.

During 1946, plans were announced for the 1040-mile Trans Arabian pipe line from Saudi Arabia to the Mediterranean, first of several new Mediterranean outlets to the Persian Gulf fields. Although a part of the equipment is on the ground, work has now been virtually halted by the disturbances in the Arab States caused by the decision to partition Palestine. At the same time, there is some delay in the Syrian Parliament's ratification of the agreement for transit rights across its territory. The line still is scheduled for completion in 1950.

In preparation for the increased calls upon production, Arabian American Oil Company has stepped up its drilling activity and completed 22 new wells during the year, most of the activity having been concentrated in Abqaiq and Qatif. Late in 1946 this exploratory drilling resulted in discovery of the new Buqqa field which may eventually prove to be an actual connection between Abqaiq and Qatif. In addition to the discovery, two other tests have been drilled to prove it as an important producing area.

During the year construction was likewise started and completed on a new pipe line from Abqaiq to Ras Tamura, the site of the company's refinery, making an additional 100,000 barrels daily of Abqaiq crude available to the deep-water port on the Persian Gulf. At the same time work has progressed

Baash-Ross News

BAASH-ROSS TOOL COMPANY · LOS ANGELES · HOUSTON · NEW YORK

OUR 28th YEAR

4 HAZARDS

MAKE BAASH-ROSS DRILL COLLAR SLIPS "MUST" SAFETY PROTECTION

. . . And Every Drill Collar from 3" to 8¼" can have this vital protection!

Baash-Ross Drill Collar Slips—"Long" Type

FOUR HAZARDS make supporting a drill collar in the rotary table one of the riskiest of all rig operations . . .

. . .1 *The constant change of drill collar diameter caused by wear and abrasion against the fresh-cut walls of the hole.*

. . .2 *The usual flush design with no shoulders for stopping a slipping drill collar.*

. . .3 *The drill collar's hard heat-treated surface that reduces gripping efficiency.*

and 4 *The relatively low drill string weight available for wedging the slips into the bowl.*

That's why safety-minded operators throughout the world have adopted Baash-Ross Drill Collar Slips as "must have" rig equipment, because these Slips are *specially designed* to overcome the risks of supporting a drill string in the rotary table. In contrast to the normal fixed-curvature design of rotary slips, the unique multi-segment design of Baash-Ross Drill Collar Slips permits them to w-r-a-p around the drill collar like a chain tong. They take a full slip-proof grip whether the drill collar is new or worn, round or out-of-round. *And they automatically compensate for as much as 1½" change in drill collar diameter — more than ample for modern drilling operations.*

For example, note in the table how a Baash-Ross Drill Collar Slip that fits a 7" diameter drill collar will also fit *any* diameter down to 5½". Adjustment for wear is automatic and continuous throughout the working range!

This means that Baash-Ross Drill Collar Slips automatically take a *full* grip on any drill collar within their range—a grip that gives adequate support to compensate for the continuous wear which changes drill collar diameters . . . for the hard heat-treated surface . . . and for the lack of drill string weight.

Sizes and Operating Ranges of Baash-Ross Drill Collar Slips

SIZE*	Operating Range	
	From	To
A	3"	4½"
B	3¾"	5¼"
C	4¼"	5¾"
D	5½"	7"
E	6¾"	8¼"

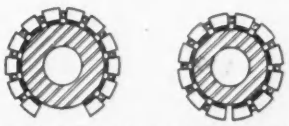
*(all sizes available in both "Regular" and "Long" types)

TWO TYPES

Baash-Ross Drill Collar Slips are available in two types —"Regular" and "Long." The "Long" type has extensions above the gripping area to provide a seat for the Baash-Ross Safety Clamp — the clamp that puts a non-slip, *yet removable,* "stop shoulder" on *any* drill collar to compensate for the hazards of flush design when supporting the collar in the table. For complete details see your nearest Baash-Ross representative — or write direct!

The "Why" of Baash-Ross Drill Collar Slips

ORDINARY SLIPS that fit the drill collar when new (A) are unable to adjust themselves to smaller diameters as the drill collar wears away. Result, grip becomes less and less adequate (B) and risk of a costly fishing job constantly greater.



BAASH-ROSS DRILL COLLAR SLIPS consist of many narrow slip segments flexibly linked together. Result —they w-r-a-p around the drill collar and always take the same *full* grip whether drill collar is new or worn, round or out-of-round.

LINERS ARE EASILY RENEWED

To insure long life, minimum maintenance and maximum gripping efficiency at all times, the liners in Baash-Ross Drill Collar Slips can be readily renewed by simply pulling a stainless steel pin, sliding out the worn liner, inserting a new liner and replacing the pin. *It's simple, quick and inexpensive!*

on construction of the camp areas for housing staff members and workmen. The camps include complete facilities for living, including commissaries, clubs, and recreational facilities.

Throughout 1947 a rig has been kept busy on Bahrein Island and completion of six wells has allowed increase to 28,000 barrels in daily production. Additions to the Bahrein refinery increased its capacity to 153,500 barrels daily toward the end of the year.

Much Activity in Kuwait

Kuwait, containing the Burghan field, believed by many to be the largest concentration of crude reserves in a single field, also was the scene of considerable activity during the year. Although the field was discovered early in 1938, lack of outlet and wartime conditions kept it from being placed on production until June, 1946. During 1947 Kuwait Oil Company placed two new drilling rigs in operation in the field, completed rehabilitation of the wells cemented up during the war, and drilled new wells. In addition five new rigs are in process of being asembled for drilling. With wells only 4750 feet deep and with new equipment and familiarity with conditions, prospects are that drilling time will be cut below the present 100-day average. Field developments here should be completed rapidly enough to more than keep pace with transportation capacity, now around 55,000 barrels a day. Work in the field has included construction of tankage and flow stations, and installation of submarine loading lines to a tanker berth more than three-fourths mile offshore.

There is some prospect ultimately of a feeder line from Kuwait to connect with a proposed 34-36-inch line to be built from Southwest Iran to the Mediterranean, primarily for the purpose of moving Iranian crude, but which may have some space for Kuwait oil. Also possible, although now far in the future, considering political unrest as well as shortage of steel, is a "Big-Inch" line from Kuwait directly to the Mediterranean. Mills now capable of rolling big pipe would have to wait until orders for the other big carriers were filled before starting to roll pipe for another line.

Situation in Iran

The 34-36-inch line from Iran was planned following a deal whereby Anglo-Iranian Oil Company will sell substantial amounts of crude over a period of the next 20 years to Standard Oil Company (N. J.) and Socony-Vacuum Oil Company.

Production from Iran is limited to the throughput capacity of the refinery at Abadan under the present system of operation, and although rated installed capacity is 477,000 barrels daily at this, the world's largest refinery, its operating capacity on a year-by-year basis is no more than 410,000 barrels. It operated through 1947 at about 405,000 daily. Preliminary work now starting is designed to increase the practical capacity of the plant by about 80,000 barrels daily. The company operates only three or four drilling rigs regularly, since the producing capacity of wells in its fields is such that very little drilling is necessary.

The Haft Kel field alone produces half of Iran's output from 17 wells. A new 25-mile pipe line was installed during the year connecting the Lali field, with the pipe line system from Jasjid-i-Sulaiman to Abadan, and giving the field its first outlet. This field was discovered just before the war, and operations were not continued until 1947, when a test completed in April flowed initially at 21,000 barrels daily. Here, as in the other Iranian fields, formations are thick Oligocene limestone beds, but in contrast with the other fields, it has been found neecssary to use acidization treatment at Lali.

A considerable amount of geological and geophysical work has been carried out by the company on the concessions it now holds, and several structures are said to have been found which have not yet been drilled. Iran's six oil fields now being produced have a total proved oil area of 137,600 acres, yet the present output is from 67 wells. No great increases in production are anticipated prior to completion of the big line to the Mediterranean, but it is anticipated that at that time, three to four years from now, it should be producing as much as 750,000 barrels daily.

Meanwhile, the end of the year saw a recurrence of the strong feeling in Iran that the concession agreement with Anglo-Iranian Oil Company should be revised. The concession covers 100,000 square miles of Southwestern Iran and runs until 1993.

At the same time there is some agitation in the Iranian Parliament for return of the independent Sheikhdom of Bahrein to Iranian sovereignty. The island is now under concession to California Texas Oil Company which operates an oil field producing 25,000 barrels daily and a refinery with daily throughput of more than 100,000 barrels a day.

Other issues met by the Iranian Parliament included its refusal late in the year to ratify the concession agreement whereby Soviet Russia was to have obtained a concession covering a strip across the northern end of Iran. The Soviets took strong issue with the decision, charging "crude discrimination against the Soviet Union" and also warned that "grave consequences" might follow the rejection of the earlier agreement.

A factor in the rejection of oil agreements here has been the stream of anti-Iranian propaganda into Persian Azerbaidjan from Moscow and Baku radio stations.

A local corporation has been formed for the exploitation of oil in the region of Qum, about 110 miles south of Teheran.

Iraq and Adjacent Areas

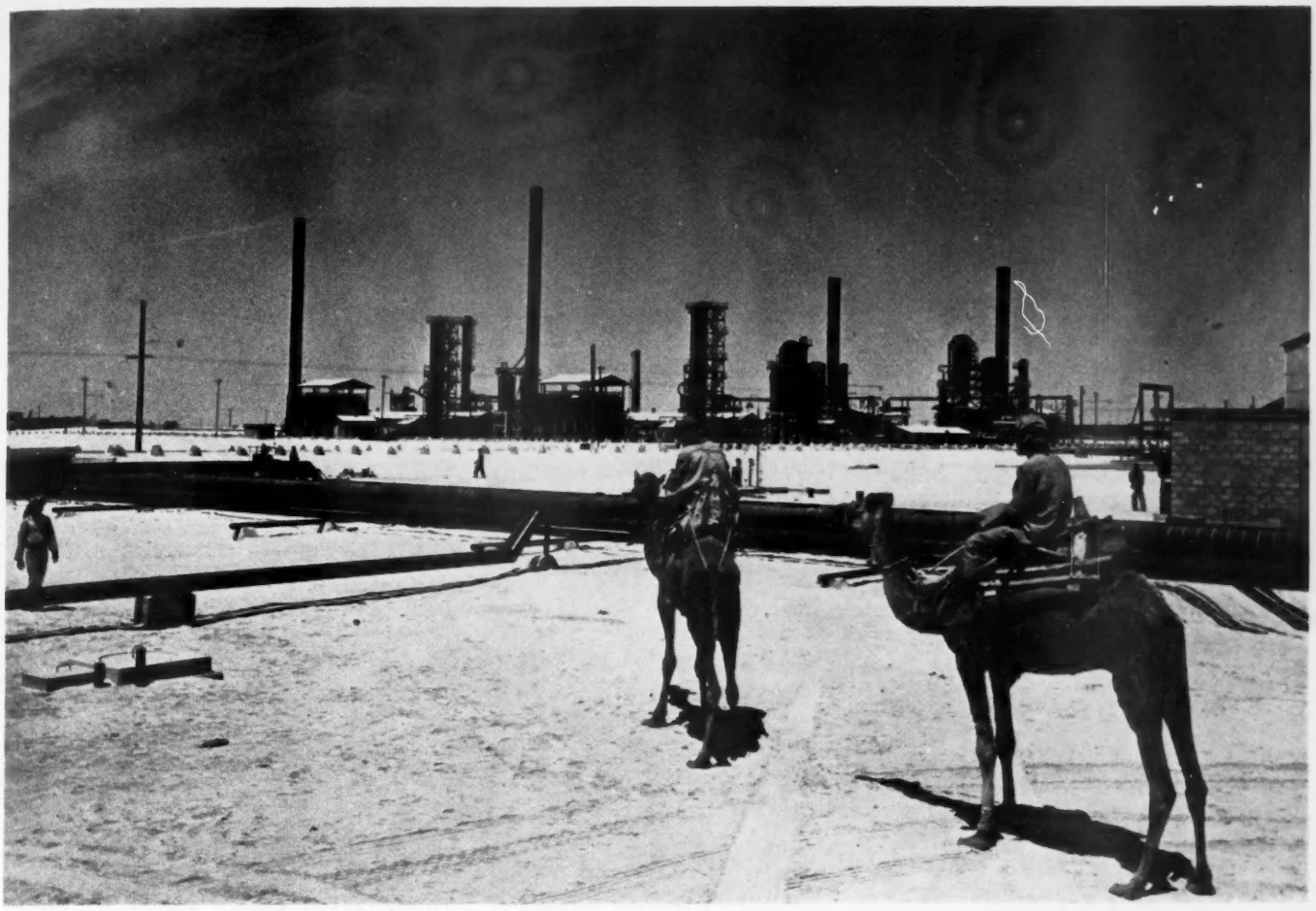
Iraq Petroleum Company has instituted a vigorous drilling program since the close of the war with a two-fold purpose. First, it would insure that development of the Kirkuk field will have proceeded far enough to adequately supply the new 16-inch pipe line now under construction from Kirkuk to Haifa to increase outlet from the current 90,000 barrels to perhaps 250,000 barrels daily. Secondly, it has started wildcatting in Syria, Lebanon and Palestine as part of a program of exploration which has already covered thousands of square miles of reconnaissance and other work. It also has planned enlargement of the Haifa refinery which now has a capacity of 85,000 barrels daily.

The Kirkuk structure, 65 miles long and perhaps 1½ miles wide, apparently needs very little field development beyond that now planned or in progress, since the character of the field is such that comparatively few wells are required for efficient exploitation. Having hydrostatic continuity throughout the reservoir, with a gas cap and an effective water drive, its exploitation should remain quite simple. Two rigs are active on the structure, and more than 20 wells have been drilled since the close of the war.

Expansion in Venezuela

Venezuela, standing second only to the United States in volume of production, made great strides in development during 1497. It maintained a steady increase in output through maintaining a like increase in the volume of drilling, and has likewise been active in all other phases of the industry.

Construction has been proceeding on refineries by Shell Oil Company and Creole Petroleum Corporation on Paraguana Peninsula whose capacities will total 100,000 barrels daily, and ground was broken during the year for the construction of still another refinery, a 20,000-barrel plant to be built at Puerto la Cruz by Mene Grande Oil Company. Creole also decided to make additions to the refinery at Caripito to increase its capacity from 70,000 barrels to 90,000 barrels a day. The increased refinery capacity in Venezuela will have its



Operations have been continuously stepped up at this Saudi Arabia refinery, and enlargement is again necessary.

effect on the world situation through easing the pressure on West Indies, U. S. and European refineries.

Major pipe line projects of the year included completion of a 103-mile, 12-inch line from the Guico field, Eastern Venezuela, to a Carribean terminal at Puerto la Cruz; commencement of work on other major carriers including a 157-mile, 12-inch line from the Central Venezuela Las Mercedes field to a terminal near Puerto la Cruz; and a 144-mile 24- and 26-inch line from Rio Ule to Amuay Bay on Paraguana being built by Creole to carry 280,000 barrels a day as a relief to its lake tanker situation. At the same time the ambitious plans of the company indicate that completion of this line will not allow retirement of any of the tankers now in use, since plans call for doubling of its already substantial production in the Lake Basin of Western Venezuela.

During 1947 operators in Venezuela increased drilling equipment in use from 108 to 142 rigs, not including a number of structure drills and other rigs used exclusively for workover operations, and material now on order indicates that this will be increased during 1948. As a result of the accelerated drilling program which saw an increase of 21 percent in the number of wells drilled during 1947, it is believed that substantial additions have been made to the nation's crude reserves over and above that withdrawn in reaching its record production of more than 435 million barrels.

Additional stepout and deeper drilling on the flanks of the Quiriquire field, oldest in Eastern Venezuela, has brought on a new drilling campaign and has proved, in the opinion of operators, as much additional reserve as had previously been assigned to the field.

New areas yet lacking definition or evaluation have been discovered in the Orinoco Basin of Eastern Venezuela in addition to the new reserve added to older fields, and with completion of the Las Mercedes pipe line perhaps late in 1948, an evaluation of the potentialities of that Central Venezuela field may be made. The field has been the scene of steady development for several years, but lacking an outlet wells were closed in immediately upon completion and no performance record under production conditions has been possible.

Late in the year a new field was opened in the remote state of Barinas by Socony-Vacuum with its attendant problems of transportation of development-scale equipment and materials to the field and of production to markets. More drilling is in order before any concrete plans can be made.

One of the most important developments of the year was the expansion of the Cretaceous limestone production in Western Venezuela, particularly in the La Paz and Mara fields where wells produce at rates comparable with those in the Middle East fields, and where formations so far proved have been found to be fully as thick. Mara field, in which several operators will have a part in production, has already proved an oil-bearing section of 2000 feet on the top of the structure, and has found the formation 2000 feet downdip still 1800 to 2000 feet in thickness with no bottom-hole water in evidence. The formation has now been found productive at each end of a long trend, holding much promise for more of this type of producing field and 20 rigs are working on development and exploration.

Of only slightly lesser importance has ben the continued extension of the Eocene Pay of the Lake Maracaibo fields farther out into the lake, with development limited only by the physical limitations of building foundations for operation in the deeper water. Two outposts, recently completed 2½ to 3 miles past any previous production, are believed to have proved an area perhaps

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five miles wide by 15 miles long in addition to that already proved by development.

At the same time Venezuela operations were showing a decided trend toward the increased efficiency of producing operations through proper handling of gas. In a number of fields construction has begun on facilities for gathering, processing, and returning gas to the reservoirs for purposes of pressure maintenance. Such plants are in operation at Quiriquire, Santa Barbara, Jusepin, Oficina and Guara in Eastern Venezuela, and are planned for other areas, including San Joaquin and Mulata.

Argentina and Brazil

One of the most significant developments of the year for Argentina was its departure from previous policy through signing of a contract with Drilling and Exploration Company for drilling about 40 wildcat wells on a contract basis. Along the same line was the securing of an offer from Glenn McCarthy for possible management of the petroleum development features of its Five Year Plan. The fact that McCarthy and Argentina failed to get together on the plan does not detract from its significance.

Argentina showed further evidence of its need for products and fuels by starting construction on a 1030-mile gas line from Buenos Aires to the fields at Comodoro Rivadavia. The nation's program of industry expansion also calls for enlargement of its refining facilities, first step toward which will be the addition of new units to the La Plata refinery. This is to be done immediately, since postponement of the plan for building a new 22,500-barrel refinery at Buenos Aires.

Although Brazil has failed to materially increase its output of oil from the Bahia area, developments have indicated that its potential producing situation has been improved by opening of the Dom Joao field in that area. At the same time operators from the U. S., Great Britain and others were watching the progress of Brazil's new petroleum law, being prepared to implement the change in constitution which would allow foreign operators to enter the exploration and development phases of the oil business in that country. Changes in general sentiment of the press and members of the administration indicated that chances for such a favorable law are good, although it will not be handled in time to become effective before some time later this year.

Mexico and Canada

Despite an increase of 7¾ million barrels in Mexico's production during 1947, Pemex officials are gravely concerned over meeting the rising demand. Failure to discover new reserves in any appreciable quantities led to the decision late in the year to embark on an all-out exploratory campaign which would include drilling 75 wildcat wells a year with the help of American equipment and personnel and at a cost of $17 million a year.

The opening of the Leduc field in Alberta, Canada, was of great strategic importance to that nation, and this is reflected in activity which has resulted in completion of enough wells to justify reserve estimates of from 50 million barrels upward, construction of new pipe lines, and a refinery. The refinery is at Edmonton and should be ready to start operations this year. The discovery came at a time of marked decline in production from Turner Valley, and is in a position where the crude or products can be moved to consuming centers to the east or west. Its stimulation of exploratory work has already resulted in opening new areas in the region. With decline in the Turner Valley field it has been necessary to import crude from the U. S. to supply the refineries in the area, and this may not now be necessary.

European Development

European areas, on the whole, have not received the same degree of postwar development as has been possible in other areas. The most prolific areas are in regions now dominated by the Russians, and even before the Soviets removed the velvet glove there was a marked reluctance of foreign operators to risk any great amount of capital on replacing wornout equipment and embarking on a spirited development program to halt production declines following the excessive withdrawals during the war.

Roumanian production, which accounts for more than any other except Russia, fell off during 1947 to a daily average of 78,323 barrels from the 1946 average of 85,496 barrels daily, and decline likely will continue during 1948 unless plans announced by the Soviets materialize. Under Russian urge and with Russian support they expect to drill twice as much hole as in 1947 and bring production back up to the 1946 level.

Reports from Russia itself indicate that 1947 has been a year of great activity with an ambitious program of covering most of the country's potential oil-bearing area by aerial magnetometer surveys, followed by core-drilling and other detail methods of exploration, and actual wildcat drilling. New oil areas have been reported in the Ural-Volga, Turkestan, and Baku regions, and additions to the transportation and refining branches. Purely on the strength of published reports by the various information bureaus it is assumed that 1947 has seen a rise in production to around 490,000 barrels, with an increase of more than 10 percent expected for 1948.

East Indies Rehabilitation

The Netherlands East Indies and British Borneo fields, most of which were destroyed during the war, have been slow in rehabilitation because of continual unrest among the Indonesians since the close of the war, particularly in Sumatra and Java. However, toward the close of the year restoration of fields, pipe lines and refineries had proceeded to the point where production from the region was beginning to make itself felt. Production was nearing 55,000 barrels daily, with refinery capacity gradually being restored and it is expected that refinery operating level should be doubled during 1948 with still greater increases in crude production.

In Dutch Borneo production has been brought to 13,600 barrels and refinery capacity to 7785 barrels daily after the refinery had been destroyed. During 1948 it is expected that production will increase by no more than 3000 barrels daily, but the refinery operating level should reach 26,000 barrels a day, or higher than prewar capacity.

Sumatra and Java, both strongly affected by the Republican movement, have been delayed more than any other world areas. Many of the fields and refinery sites are still unapproachable, but where possible work has proceeded. At Pladju the Royal Dutch Shell refinery started rehabilitation in the fall of 1946 and had brought capacity by the fall of 1947 to nearly 35,000 barrels a day. It was expected that it would be operating at more than 52,000 barrels daily by the end of this year. Field output in the area had reached 27,250 barrels daily by fall and was expected to reach 72,000 barrels daily by the end of 1948.

The only other Sumatra fields approachable are in the Soengei Gerong area where Standard Vacuum Oil Company had a small amount of production built up at the end of the year. As recently as September some of the wells were fired by extremists. The refinery started operations in September at about 1000 barrels daily, which is expected to increase during the year.

In Java only the Krukah area is being worked with 38 wells now producing 1140 barrels daily, and the Wonokromo refinery has rebuilt enough units to operate at about 1600 barrels a day.

World Demand

Moving Towards 10 Million Barrels Daily

WORLD WIDE demand for all oils in 1947 reached a staggering total of 8,647,000 barrels a day, an increase of 11.2 percent over the demand for 1946. In supplying this demand the producers of the world furnished 9 percent more crude than had been produced in the record year of 1946, with an additional increase in the supply of natural gasoline and other liquid hydrocarbon products.

This production, with its attendant acceleration of development, transportation and refining, merely serves to emphasize the full implications of what demand is likely to reach during the next few years. The outlook at the present time indicates that world demand by 1951 will have reached a total of not less than 11,309,000 barrels a day. Most petroleum economists have projected their estimates of the needs of the world through 1951, and it has been generally conceded in recent months that world demand would climb to 10 million barrels a day by 1951. It looks now as though this figure were quite conservative, and demand will have reached 10 million barrels daily by late 1949 or early 1950, with no indications that it will not continue to rise at rates comparable to present increments. Some experts, in looking ahead to 1956, and even as far as 1960, have seen no lessening of insistent demand. But, here too it appears that their estimates will be reached long before then.

The record of 1946-1947 may serve as a partial index to the rapidity of the changes since the close of the war. In 1945 an industry committee reported to a special Senate subcommittee that a domestic demand of 4,395,000 barrels was expected in the U. S. for 1947. The actual domestic demand of 5,451,000 barrels was not anticipated for another ten years, and is actually more than the demand for the entire world in 1938, the last full peacetime year before World War II. In the rest of the world, outside the U. S., it is expected that demand will grow faster in the next few years than it will in the U. S.

In forecasting a demand of 11,309,000 barrels a day by 1951 it is assumed that the U. S. domestic demand will account for 6,629,000 barrels a day and that the rest of the world will need 4,680,000 barrels a day. Of the foreign demand perhaps 1¼ million will be needed in the Western Hemisphere outside the U. S., leaving an estimated 3,430,000 barrels as demand for the Eastern Hemisphere.

The future demand is expected to continue upward, with the only expected change in forecasts of several months ago the certainty that it will climb faster than had been anticipated. The conservative Bureau of Mines had already estimated that demand for 1948 will be 5,700,000 barrels in the U. S. and 3,300,000 barrels in the rest of the world, for a world total of 9 million barrels.

Demand-Raising Factors

Many factors combine to indicate the soaring world need for petroleum. The acute shortages of coal and other sources of fuel and power in countries devastated by the war, coupled with their efforts at rehabilitation and reconstruction, have intensified their need for petroleum products. At the same time the rapid conversion from wartime to peacetime manufacturing in the U. S. has greatly increased its demands over any thought possible a short time ago.

The estimates of future world demand presuppose that the world will be able to supply this much oil at the time and at the points needed. Under existing circumstances of material shortages this task will be none too easy. It is assumed that new reserves will be found in the U. S. if it is to supply the demand it will be asked for. Under stress of past and present demand, and with a favorable crude price situation, the nation is producing regularly a greater proportion of its reserves than any other country in the world. It is unlikely that it can bring its crude production safely to a point much higher than current rates without continuing to find reserves in substantial quantities. With the increase in demand for the remainder of the Western Hemisphere, it is unlikely that a surplus will be available from the hemisphere. The net result may be that oil for the increased demand in the East-

World Petroleum Supply, 1946-1951
(Barrels Daily)

	1946	1947*	1951† (Estimated as Attainable)
United States	4,749,000	5,077,000	5,166,000
Caribbean Area	1,180,000	1,217,000	1,539,000
Other Countries	254,000	279,000	342,000
Natural Gasoline, etc.	332,000	375,000	425,000
Total Western Hemisphere	6,515,000	6,948,000	7,472,000
Middle East	702,000	823,000	1,487,000
Russia (Estimate)	455,000	471,000	600,000
Other Countries	211,000	315,000	416,000
Natural Gasoline, etc.	51,000	52,000	54,000
Total Eastern Hemisphere	1,419,000	1,661,000	2,557,000
Total World	7,934,000	8,609,000	10,029,000

Source: L. C. McCollum.
* This column added by World Oil for comparison. † Estimated as obtainable.

ern Hemisphere must come from that region.

An accompanying tabulation indicates the distribution of supply sources as forecast by L. C. McCollum (then with Standard Oil Company (N. J.) and now with Continental Oil Company) at a meeting of the Independent Petroleum Association of America in May, 1947. It is realized that the demand picture has changed materially since that time, but the tabulation indicates the sources from which new supply is expected.

The figure of 5,166,000 barrels estimated as new supply of crude oil from the U. S. in 1951 represents only a slight increase over the average rate of production in 1947, and is actually a decrease below the current production early in 1948, when output has been steadily above 5,300,000 barrels a day, but there is reason to assume that maximum efficient producing rates will have declined to something like that amount by 1951. At the same time it is entirely possible that the anticipated producing rate for the Middle East may prove a little high, since here most estimates of production from that area are based on ability to transport the oil rather than the ability of the fields to produce it. Pipe lines upon which work has already started should be reaching completion by some time in 1950 or before, although other large lines are not expected to be usable before 1952 or 1953. However, with tanker building programs now in effect in England, Norway and other countries, it is believed that firm demands for more crude from the Middle East will result in its movement to needed points.

At the same time, should some transportation shortage still exist in the Middle East the chances are that the U. S. and Caribbean producers will make up the difference, especially if crude oil prices remain at a high level. Production from Venezuela is increasing rapidly and with some small, but steady increases from Colombia and no great decrease in Trinidad, the Caribbean area should have built up its producing capacity materially within another few years. Early in 1948, Venezuela was producing nearly 1¼ million barrels daily, and its exploration program of the past year or so has been quite successful. A record number of drilling rigs is engaged in exploratory and development work.

In addition to adequate production of crude oil and other liquid hydrocarbons

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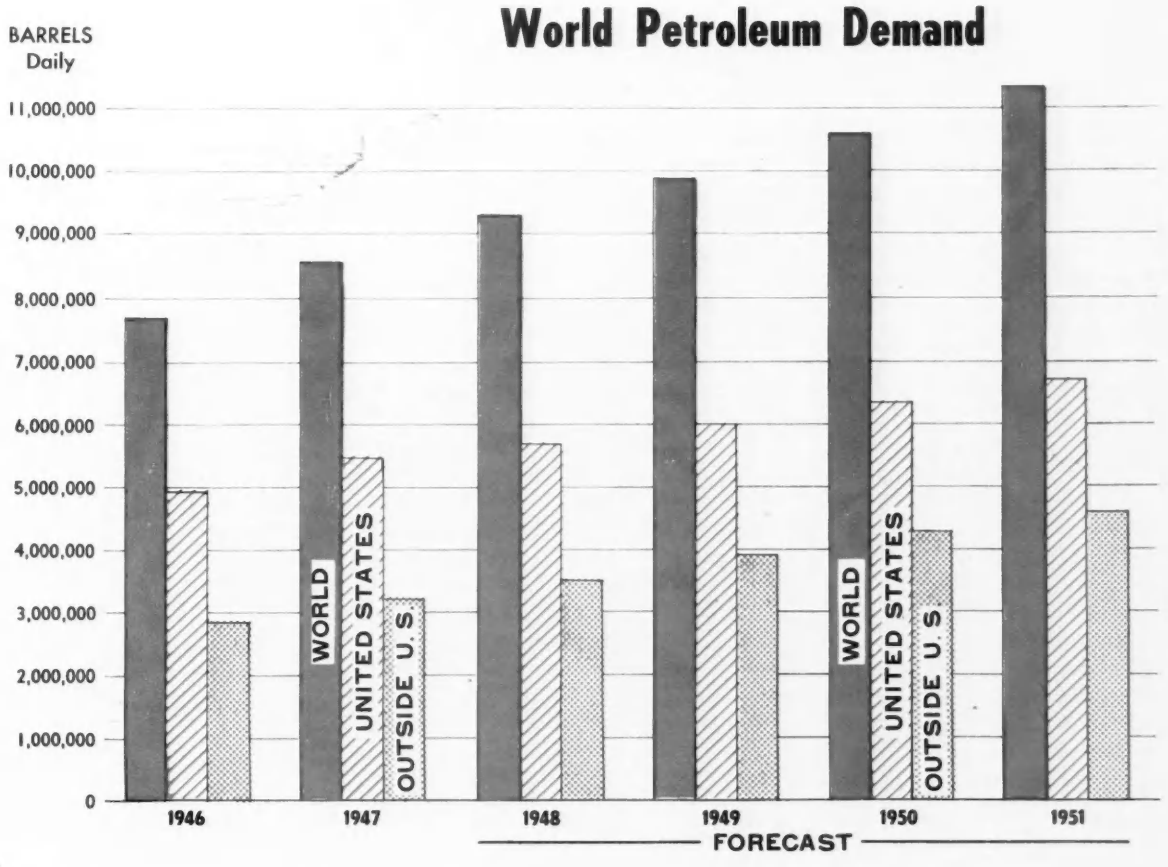
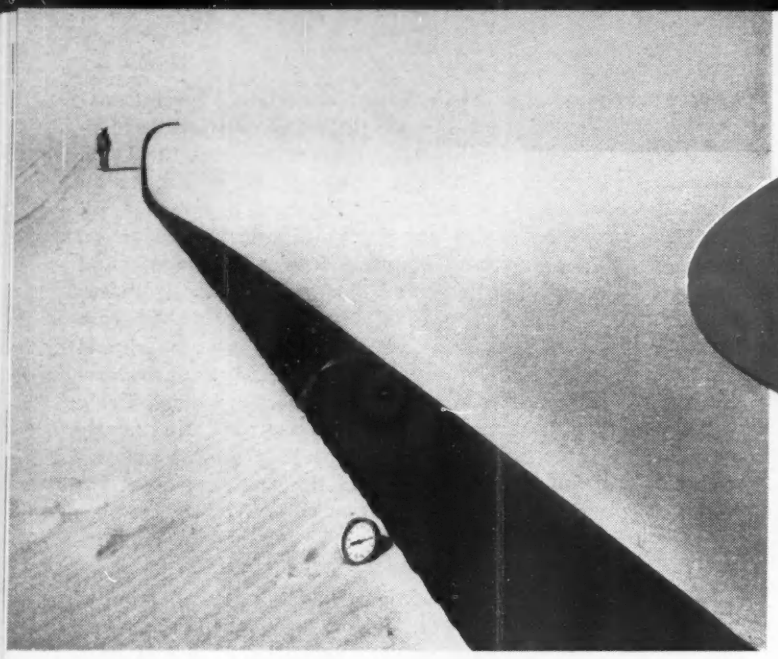


YEAR	U.S. Domestic	Outside U.S.	World Total
1938	3,115,000	2,127,000	5,272,000
1939	3,373,000	2,162,000	5,535,000
1940	3,625,000	1,838,000	5,463,000
1941	4,071,000	2,528,000	6,599,000
1946	4,907,000	2,866,000	7,773,000
1947	5,451,000	3,196,000	8,647,000
1948	5,726,000	3,516,000	9,242,000
1949	6,012,000	3,868,000	9,880,000
1950	6,313,000	4,255,000	10,568,000
1951	6,629,000	4,680,000	11,309,000

Note: For this forecast increases of 5 percent per year were assumed for United States demand, and 10 percent per year for the rest of the world.



World Pipe Line Plans

Hinge on Materials, Costs and Politics

ACTUAL completed construction of oil, gas and products lines in countries outside the U. S., according to available information, totaled only 840 miles in 1947. Slightly more than one-half this total was gas lines. However, 4371 miles of lines were reported being laid at the end of the year, and 1442 miles were to be constructed whenever worldwide shortages delaying pipe line work were eased. Companies were considering the construction of another 4337 miles of lines between 1949 and 1951, depending on whether pipe could be obtained, costs were not prohibitive, and the political situations in various sectors of the world permitted.

Most of the mileage represented by lines completed or building at the end of 1947 was in South America and the Middle East. A 1030-mile gas line, part of Argentina's Five-Year Plan, was started early in the year but little progress was made. Work continued steadily on the 395-mile Bolivian crude line, Tropical Oil Company completed its 56-mile products extension in Colombia and Socony-Vacuum Oil Company its 109-mile crude system in Eastern Venezuela; and two crude lines in Western and Central Venezuela were being started.

In South America, 177 miles of pipe line were finished, 1736 were being built, 136 were in an advanced planning stage, and 711 were being considered.

Most of the work in the Middle East was either under construction or proposed. Iraq Petroleum Company's 620-mile Kirkuk-Haifa line made fair progress until slowed by political and internal problems arising out of the partition of Palestine. Work just begun on the 1040-mile Saudi Arabia to Mediterranean TAPline faced the same interruptions. Only a 25-mile outlet for the Lali field in Iran was completed; 1721 miles of line were being laid; 983 were proposed; and Iraq Petroleum was considering building a 530-mile branch to its Tripoli terminal connecting to the system now under way. Not accounted for is the indefinite plan for picking up Kuwait oil. A Burghan field outlet might tie into the proposed Middle East Pipe Lines project, or might be connected to TAPline.

European Construction

According to reports from various European countries, 432 miles of pipe line, gas lines in every case except two lines mentioned by various USSR sources, were completed during 1947. Under construction were 505 miles, with a 149-mile gas line definitely planned in France. An estimated 740 miles, again mostly gas, except for a products carrier in the north of France, were said to be under consideration. Not counted was a tentative French plan to construct a product line from Marseille to Lyons, approximately 200 miles of ten-inch pipe.

Mexico completed a 135-mile gas line, and had under construction 324 miles of line; 150 miles were contracted for; 150 miles, a crude oil extension, were being considered.

Canadian companies completed a number of short lines, mostly gas, but achieved only a total of 103 9/10 miles of line laid during 1947. There was no construction reported being carried over from 1947 to 1948, and only 97 miles of construction were definitely announced. Canada, however, had very ambitious proposals for expansion and construction. Two gas systems were being planned from Alberta's developing reserves leading west to British Columbia and the U. S. border cities and east as far as Manitoba. The two projected systems, if constructed, would total 2150 miles of pipe, and cost an estimated $135 million. Both projects depended on repeal of the ban against exporting gas from Alberta. Imperial Oil, Ltd., was also reported planning an expansion program.

A 25-mile line being constructed in Pakistan was the only pipe line activity in Asia or the Far East.

During the year, the use of extant, war-built lines was discussed in Great Britain, Panama, and Egypt. The lines, built to carry products and aviation gasoline, are maintained but generally economically inoperable. The well-known India-Burma-China line was placed by the Chinese Ministry of Communications under management of the National Highway Administration, which is reported considering peacetime use of the system, approximately 2500 miles long. Actual status of the line is unknown, some reports indicating that the Indian portion is intact and the Chinese section partly removed. Others say the line has been kept in operating condition.

Lines under construction or planned are as follows:

Argentina

Dirreccion General del Gas del Estado is constructing 10¾-inch natural gas line paralleling Atlantic Coast from Buenos Aires to Comodoro Rivadavia fields. Crews of Yacimiento; Petroliferos Fiscales, completed first 30 miles, from Buenos Aires to Canuelos. Southern end of line, approximately 1000 miles to Comodoro Rivadavia, was opened to private bids, and it was understood late in 1947 that bid of Italian firm Dalmine, S.A., Dalmine, at Bergamo to supply pipe and handle construction, under direction of YPF, had been accepted. Estimated cost $20 million, capacity about 35 million cubic feet per day.

Yacimientos Petroliferos Fiscales announced tentative plans for a crude oil line, about 450 miles from Plaza Huincul fields, Neuquen, to port of Bahia Blanca.

Bolivia

Yacimientos Petroliferos Fiscales Bolivianos began construction on crude pipe line from Camiri field to Tin Tin, proposed in 1495. Pipe shipments from the United States be-

gan early in 1947. The Government authorized contract for extension of the line from Tin Tin to Cochabamba, with 50-mile lateral from Zudanes to Sucre. Contract for construction of the 345-mile 6-inch line awarded Williams Brothers Company, Tulsa, also contractors on 5 pump stations. Line being laid on the surface, except for road crossings, is scheduled for completion by end of 1948. Capacity 8,000 barrels daily; initial throughput 3000 barrels daily

Brazil

Conselho Nacional do Petroleo, having created an Oil Pipe Line Study Commission in 1946, considered proposals for crude and products pipe lines from the port of Santos to the Sao Paulo area, where refineries are projected. A branch line to Campinas is also under consideration. Approximately 125 miles of pipe would be required.

Colombia

The Colombian Government plans to extend Tropical's new 6-inch products line from Puerto Berrio 88 miles south to Puerto Salgar. Pipe used will be invasion type, and line will presumably be capable of carrying 7,200 barrels daily.

Shell Group has a projected crude outlet for El Dificil field, approximately 48 miles of 6-inch pipe to Plato station on Andean Pipe Line Company's Barrancabermeja-Mamonal line. Its estimated initial capacity is 3,000 barrels. Survey is now being made, with expected completion in mid-1948.

Socony-Vacuum Oil Company of Colombia completed Magdalena River Crossing. From pump station in Cantagallo field 994 feet to west bank, 4620 feet across river, and 2170 feet from east bank to junction with Andean's pipe line were laid. Pipe used was 4-inch, with line capacity of 1,000 barrels of crude per day. Construction was handled by company crew.

State of Antioquia is planning a 6-inch products lateral from new terminal of Tropical Oil Company's line at Puerto Berrio to industrial center of Medellin, a distance of approximately 80 miles.

State of Caldas, following completion of Colombian Government's extension to Puerto Salgar, plans 56-mile 6-inch products lateral to another industrial city, Manizales.

Tropical Oil Company completed products line from Barrancabermeja refinery south to Puerto Berrio. The 56-mile 6-inch line has a daily capacity of 7,200 barrels. It will supply petroleum products to regions inaccessible when Magdalena River is too low for river traffic. Construction by company crews.

Canada

Dominion Natural Gas Company, Ltd., completed 16 miles of line during 1947. The company will lay, in connection with construction of a high B.t.u. oil-gas plant at Port Stanley, Ontario, to complete in fall, 1948, 10 miles of 8-inch gas line and build a compressor station of approximately 975 HP. capacity.

Imperial Oil., Ltd., completed in January, 1948, 4 miles of 12-inch, 10 miles of 16-inch, 20 miles of 8-inch, and 7 miles of 6-inch crude and supply lines in and around its Montreal refinery. Williams Brothers Corporation, Tulsa, contractor.

Imperial Oil, Ltd., completed a 5-mile 8-inch, 3000-barrel line from Froomfield to the Sarnia, Ontario, refinery.

Imperial Oil, Ltd., completed two 8-inch lines from the pipe line gatehouse, Canadian side of St. Clair River, International Boundary, to Sarnia refinery, 4 miles away.

Imperial Pipe Line Company, Ltd., completed outlet for Leduc field, an 8-mile 8-inch line to storage tanks at Nisku, where crude is shipped by rail to East Calgary and Regina refineries. When Imperial's refinery at Edmonton, Alberta, is completed a 17-mile line will be laid to connect at Nisku.

Imperial Pipe Line Company, Ltd., completed a gas line, about 10 miles, from Becher field, Ontario, to a station on Union Gas Company's line to Sarnia. Initial volume of line 3 to 4 million cubic feet per day.

Lloydminster Gas Company completed a 5½-mile 6-inch gas line from Lloydminster field to town.

Northwestern Gas Utilities, Ltd., boosted capacity of pipeline system to 80 million cubic feet daily by addition of a 19 2/5-mile 16-inch loop on line connecting Viking-Kinsella gas field with Edmonton. Loop is from town of Holden to point 2 miles east of Tofield, 32 miles southeast Edmonton. Company also laid distribution lines in communities of Camrose, Ponoka, Red Deer and Wetaskiwin, which year before were linked to system.

Northwest Natural Gas Company is proceeding with tentative plans for natural gas pipeline from Southwest Alberta, across Rockies, following an American route down Columbia River, to serve such U. S. cities as Portland and Seattle, and swinging north into Canada to serve Vancouver, B. C. There may be approximately 850 miles of 24-inch main line, with additional 500 miles of 6- to 20-inch gathering lines. Capacity estimated 200 million cubic feet a day. Northwest is negotiating with owners of large gas reserves, but final arrangements depend on repeal of Alberta ban on gas exports.

Montreal Pipe Line Company, Ltd., will construct 70 miles of 20-inch light crude line from U. S. border to Montreal East, Quebec. The 166 miles of line in U. S. will be constructed and operated by Portland Pipe Line Corporation. Owners do not anticipate being able to obtain pipe until 1951. Proposed line will parallel present 12-inch carrier.

The Saint Paul Syndicate, owned by independent oil operators and business men of St. Paul, Alberta, constructed a gas line approximately 1 mile northwest to the town from a shallow gas discovery. Service to be extended from industrial to domestic consumers in 1948.

Western Prairie Pipe Line Company, formed by Winnipeg, Manitoba, financial group, applied to Dominion Parliament to incorporate, for building a gas system from Calgary area in Alberta across Saskatchewan and Manitoba as far as Winnipeg, an estimated 800 miles. This, like Northwest Natural Gas Company, project, depends on repeal of Alberta ban on gas exports.

Czechoslovakia

Czechoslovakian Government reported extending 10 miles of gas transmission lines to the Teschen District in Poland to receive natural gas for Vitkovice and Trinec Works. In return for gas, Poland will be supplied with machinery, motor vehicles, and drilling equipment.

Czechoslovakian Government completed 90-mile gas line from Stalin Works at Brux to Prague.

France

The French Commission for the Modernization of the Oil Industry announced a plan to construct a 160-mile 10-inch line to transport gasoline and gas-oil from Le Havre to Paris. Construction may not get under way for some time.

Regie Autonome des Petroles completed 22 miles of 4½-inch gas line between Tarbes and Pierrefitte, via Lourdes; 38 miles of 12½-inch line from Boussens to Toulouse; 10½ miles of 9½-inch from St. Marcet gas field to Boussens; and 34 miles of 5½-inch from Capens to Pamers. Previous plans to continue line from Toulouse to Bordeaux, 149 miles of 8-inch with a capacity of 7 million cubic feet per day, were defined.

Iran

Anglo-Iranian Oil Company, Ltd., expected to complete by end of 1947 an 8-10-12-inch crude line, approximately 25 miles, from Lali field to connection in the Masjid-i-Sulaiman field at Tembi. Line will carry initially about 10,000 barrels a day.

Anglo-Iranian Oil Company, Ltd., has planned for completion in 1949 a second crude line from Lali to Abunji on the MIJ-Abadan carrier, approximately 27 miles of 12-inch pipe will be laid by company crew. Capacity will be 40-45,000 barrels daily.

Anglo-Iranian Oil Company, Ltd., plans to lay, in anticipation of increasing crude exports in 1949, a 56-mile line from the Agha Jari field to the terminal and station of Mashur, head of the Persian Gulf. Company crews will construct 28 miles of 20-inch and 28 miles of 22-inch line.

Middle East Pipe Lines, Ltd., is completing plans to construct during 1950-1951 a crude line from Abadan to an unselected Mediterranean terminus. Line will be "biggest inch" yet constructed, probably consisting of 34- and 36-inch pipe estimated 900 miles, with throughput capacity of 500,000-550,000 barrels a day. Connection may be made with Kuwait field of Burghan.

Iraq

Iraq Petroleum Company, Ltd., has under construction a 630-mile 16-inch 120,000 barrel crude carrier from Kirkuk field to Haifa terminal in Palestine. Work has been slowed by political situation arising over partition of Palestine, but may be completed in 1948.

Iraq Petroleum Company, Ltd., is considering construction of another line from Kirkuk to Tripoli, also 16-inch pipe approximately 530 miles. Cost of the two lines from Kirkuk is estimated at $149 million.

Italy

Azienda Generale Italiana Petroli is constructing natural gas lines from Caviga, near Lodi field, to Milan, and between Caviga and Bergamo, about 25 and 30 miles respectively.

Italian Government has been considering plans for a $10 million natural gas line from Po Delta gas fields around Rovigo to Milan, via Brescia, with later lines being laid to Bergamo, north to Venice and south to Florence. More than 200 miles of line would be involved in complete project.

Mexico

Compania Mexicana de Gas de Monterrey is constructing a gas line from Mision, field near Reynosa, to old line from Roma, in Texas, to Monterrey. The 12-inch line, about 37 miles long, will carry 30 million cubic feet of gas daily. No compressor stations on line.

Gas Industrial de Monterrey, S.A., completed a 135-mile 14-inch line to Monterrey from a connection, near Reynosa, with the Reynosa Pipe Line Company's 17-mile 12-inch line from gas fields in Hidalgo County, Texas. The line carries 50 million cubic feet of gas daily to industries in Monterrey. Contratistas del Norte, S. A., and Ladewig Engineering Company, contractors.

Petroleos Mexicanos started an oil line from the Poza Rica field to its proposed refinery at Salamanca. Little actual construction done in 1947 and purchase of materials not complete for refinery. The 12-inch line will be about 287 miles long; 7 pump stations on line will handle 30,000 barrels daily throughput to refinery. Pemex considering extending line 150 miles from Salamanca to Guadalajara, where another refinery may be constructed.

Petroleos Mexicanos announced plans for a 20-inch gas line of approximately 150 miles from the Poza Rica field to Mexico City, carrying 30 million cubic feet of gas daily with no compressor stations. Contract awarded to Williams Brothers Company.

Pakistan

Attock Oil Company, Ltd., is starting a 34-mile line from Balkassar field to connect with the Dhulian-Rawalpindi crude line; but because of conditions arising from partition of Pakistan and Hindustan construction is likely to be slow.

Poland

Central Governing Body of the Industry of Liquid Fuels (CZPPP) completed a 63-mile 10-inch line from Debowiec gas field via Oswiecim, Chrzanow, Trzebinia to Krakow, to connect with an old line, repaired after war-damage, taking gas from fields in Sanok area.

Central Governing Body of the Industry of Liquid Fuels (CZPPP) completed a 9½-mile gas line from Debowiec field to Cieszyn.

Central Governing Body of the Industry of Liquid Fuels (CZPPP), according to November, 1947, reports, was considering construction of a gas line from Krakow via Kielce to the capital of Warsaw. The line

Miles of Pipe Line Construction Outside United States During 1947

	Oil	Gas	Products	Total
Completed	291½	482	66½	840
Building, End of 1947	2,799	1,572	....	4,371
Authorized	1,045	309	88	1,442
Under Consideration	1,186	2,510	641	4,337
Total Construction	5,321½	4,873	795½	10,990

would be approximately 160 miles long, but no details were available.

Saudi Arabia

Arabian American Oil Company is constructing a 61-mile 20- and 22-inch line from Abqaiq field to Ras Tanura refinery, using company crews and equipment. Line will carry both sour and sweet crude, in batches, about 100,000 barrels a day initially.

Trans-Arabian Pipe Line Company, Ltd., started preliminary phases of construction of the 1040-mile crude line from Abqaiq field to Sidon, 30 miles north of Beirut in Lebanon. In December 3 engineers were completing survey and field work, and line construction was scheduled to begin early in 1948. Pipe was arriving from the United States. The line, having a capacity of 300,000 barrels per day, will be constructed of 520 miles of 30-inch, 520 miles of 31-inch pipe, with 6 pumping stations. The project will cast an estimated $120 million, is scheduled for completion January 1, 1950. Bechtel Brothers, San Francisco, and H. C. Price Company, Bartlesville, are constructors on the eastern part of the line; Williams Brothers, Tulsa, is handling the western spread.

Sumatra

Standard-Vacuum Petroleum Maatschappij during 1947 rehabilitated and put in working order two 8-inch and one 6-inch line from the Talang Akar-Pendopo fields to the refinery near Palembang 83 miles east.

Sweden

Svenska Entreprenad Aktiebolget announced plans to construct a pair of lines to carry oil and products from Goteborg to Stockholm; may get under way late in 1948; details still being debated. Prior discussion concerned a 220-mile line of 5, 4, and 3-inch pipe. "Black oil line" will be 8- or 10-inch, and "White oil line," carrying gasoline and kerosine, will be 4- or 6-inch. Factors influencing possible postponement of project are monetary exchange rates between Sweden and United States, problem of finding pipe for export to Sweden, and delay in making preliminary surveys.

Union of Soviet Socialist Republics

Russian Government, according to last reports ,is constructing the 325-mile line linking Daszawa gas fields in former Polish territory with Kiev. Work began in 1946.

Russian Government is constructing a 125-mile gas line from the shale oil plants near Koh Tla-Jarvi, Republic of Esthonia, to Leningrad.

Russian Government completed a 125-mile crude line, carrying oil from Tuimaza fields to refineries at Ufa.

Russian Government completed a 10-mile crude line linking Pavlantash fields in Uzbekistan's Andizjan District with Leninbad.

Russian Government completed a 20-mile line from a new gas area near Yabolonovo to Pokhvistnevo.

Venezuela

Creole Petroleum Corporation completed a 10½-mile 8-inch products line from Catia del Mar, Federal District, to Nueva Caracas. Locatell Norris & Company, Atlanta, Georgia, was the contractor.

Creole Petroleum Corporation completed plans for construction of a 144-mile 24- and 26-inch crude oil line from Ule Station, Tia Juana field, on east shore of Lake Maracaibo, across Zulia, Falcon, and the Gulf of Coro to the Amuay refinery, now under construction. Work on 2 pump stations under way by Williams Brothers, contractor; no pipe has been received. Line capacity will be 280,000 barrels per day.

S. A. Petrolera las Mercedes (The Texas Company and Caracas Petroleum Corporation) began work January 1, 1948, on a 157-mile 16-inch outlet for Las Mercedes field. Approximately 10 miles 6-inch field gathering lines to be laid. Williams Brothers, contractor, expects to complete May, 1948. Loading facilities at Pamatacual Terminal, near Guanta, consisting of four 130,000-barrel tanks, and tank farms at field are also being built.

Socony-Vacuum Oil Company of Venezuela completed a 12-inch crude line, 103 miles from Guico field, Anzoategui, to Compania Consolidada de Petroleo's terminal at Puerto de la Cruz. Capacity is 70,000 barrels a day at an operating pressure of 825 pounds from field station, no other pump stations. Williams Brothers Corporation, contractor. System includes 6 miles of 12-inch from Anaco to main line.

World Demand

■ CONTINUED FROM PAGE 263

to meet the world total demand, the actual supply of the increased needs depends on completion of additional refining capacity by that time. Refining capacity now stands at 6,829,700 barrels in the Western Hemisphere, and 1,908,000 barrels daily in the Eastern Hemisphere. This is barely adequate for processing the current world supply, and even so requires transportation of some crude from the Western to the Eastern Hemisphere for refining. The flexibility of the rated refinery capacity is such that under strong urge of necessity, a certain increase in throughput could be achieved with equipment now in use. New construction and rehabilitation is now going on in the U. S. and throughout the world, with completion of new units scheduled for several years to come, including the current year. Even so, it is to be a very near thing, and entirely possible that demand will outstrip refinery construction for temporary periods during the progress of expansion.

Speaking before the Economic Club of Detroit in November, 1947, Dr. Joseph E. Pogue, economist for Chase National Bank, projected world demand to the year 1956, and visualized that by that time it will have risen to 11,800,000 barrels daily. His conclusions were based on the assumption that reconstruction of Europe and Asia will have taken place, and that no fluctuations of great latitude take place in business cycles. He anticipated that during this time there would be an expansion of 37 percent in U. S. consumption, and an increase of 76 percent in consumption by the rest of the world.

On this basis it was estimated that demand in the U. S. would increase from 4,907,000 barrels in 1946 to 6,700,000 barrels daily in 1956, and that the rest of the world would see an increase from 2,900,000 barrels in 1946 to 5,100,000 barrels daily in 1956. Since this estimate was made it seems more probable that these demands probably will be reached by some time in 1951 instead of 1956. Pogue foresees that this demand will be met without important recourse to the reserves of hydrocarbons not now available in liquid form, and from the following sources:

U. S. crude production	5,000,000 bbls./day
U. S. synthetic gasoline, natural gasoline and condensate	700,000 bbls./day
Venezuela crude production	1,800,000 bbls./day
Middle East crude production	2,500,000 bbls./day
Rest of World crude production	1,800,000 bbls./day
Total	11,800,000 bbls./day

The principal changes in Pogue's list of sources and amounts to be expected from each are a notable increase in production of synthetics and liquid hydrocarbons other than crude in the U. S., a substantial increase in Venezuelan production, and a huge gain in Middle East output. Plainly, an increase of any magnitude in demand must look to the Middle East, since no other area in the world is capable of such increases.
transport existed.

Just as plainly it is noted that through having continually borne the major part of the burden of world supply the U. S. is no longer looked to for increased crude production. It is believed that the nation has already produced 33 percent of its ultimately-expected oil resources, while the rest of the world has produced only 4 percent.

Speaking before the API in Chicago last Fall, B. Brewster Jennings, president of Socony-Vacuum Oil Company, indicated that his firm's economists anticipated an increase of 67 percent in foreign demand between now and 1960. In these figures Russia was excluded as an unknown quantity but it was noted that his estimate of 4½ million barrels daily as foreign demand is essentially the same as Pogue's except that Jennings assumed it would take four more years to reach that point. Pogue's estimate of 5,100,000 barrels daily includes Russia, which is independently estimated to be approximately 600,000 barrels by 1951.

Jennings also called attention to the inherent differences between the oil economy of Europe and that of the U. S. suggesting that there is a broad field for intelligent cooperation to the end that foreign and domestic demands be fully met. In Europe the emphasis has been on production of bunker and other fuels, whereas the U. S. has emphasized the production of gasoline and the distillate oils, running to a generally low yield of residual. Europeans have never used automobiles as the Americans have, and although they may be expected to increase their use of highway transportation in time, this development is expected to be gradual in comparison with the U. S. Since the close of the war the the use of highway transportation has been increased to some extent through necessity due to the damage to railway facilities. However, oil economists of Europe are more concerned with the disposal of gasoline made as a necessary byproduct to the manufacture of fuel oils than with the production of gasoline as a primary product. To some degree it may be possible to work out a system whereby foreign and domestic needs might supplement each other.

ISOLATING CASING

SALT WATER DISPOSAL

ACIDIZING

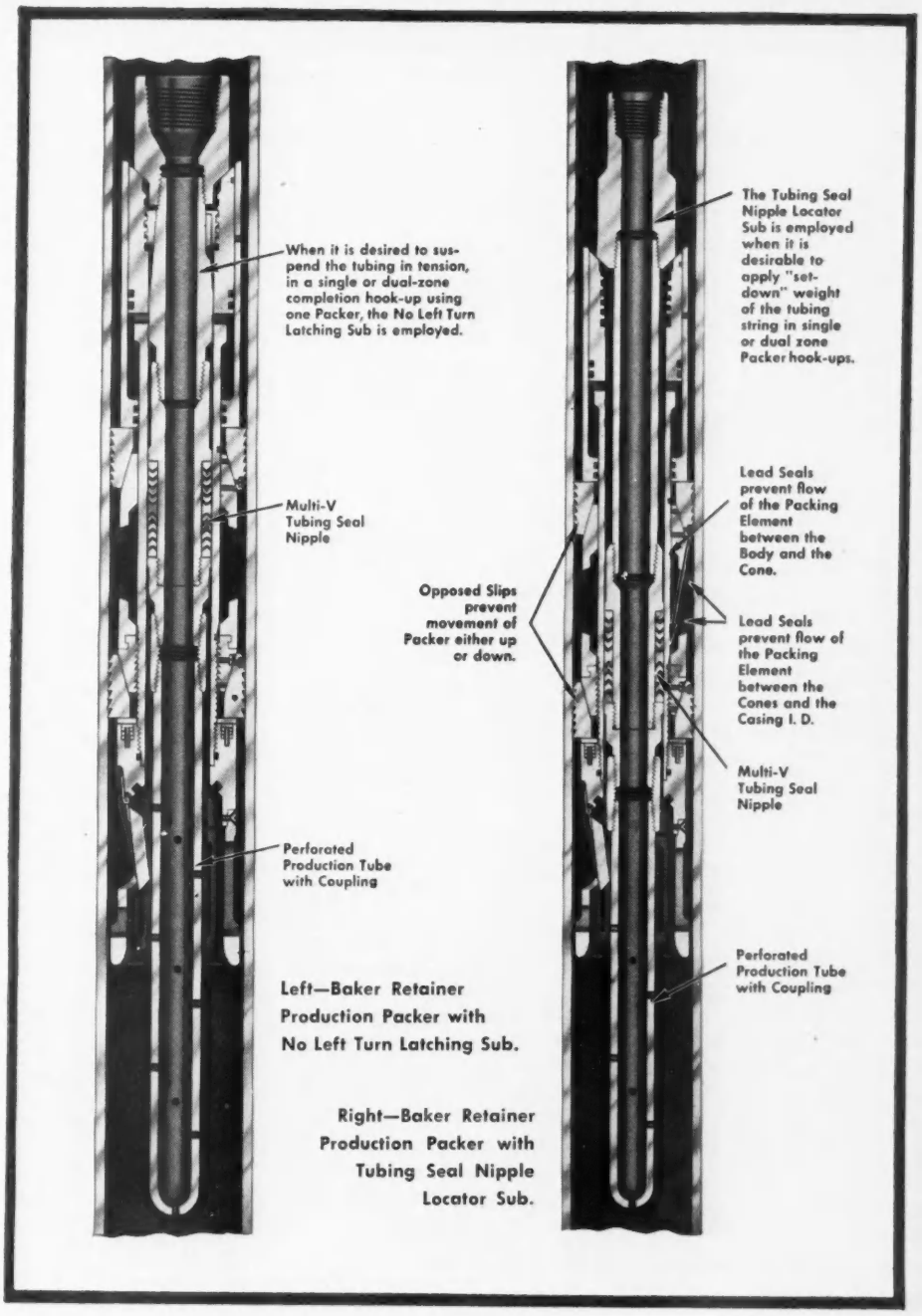
RE-PRESSURING

CAN PERFORM THEM SUCCESSFULLY

wide popularity because of its effective application to many needs in producing wells. It can be set and used for making a flow test, utilizing the Packer for production through the tubing, if the zone proves productive. If not productive, the zone can be squeeze cemented through the Packer. One Packer provides for production of two zones, either simultaneously with segregated production, or from each zone separately at different times. For complete flexibility of two-zone production, a Baker Change-Over Flow Tube (see illustration) with two Packers may be used. For three-zone production only two packers are used.

The Baker Retainer Production Packer is used for single-zone installation to prevent gas from cutting holes in the casing (often started by thread leaks) by transferring the pressure from the casing to the tubing. If and when the tubing leaks, it can be pulled, repaired and replaced through the Packer. The Packer will protect the casing, when corrosive fluid is being produced or injected, by allowing the annulus to be filled with oil and confining the corrosive action to the tubing only.

An interesting use of the Baker Retainer Production Packer is for pumping or flowing an upper zone through the tubing, and flowing a lower zone through the annulus between the tubing and the casing. This hook-up calls for use of the Baker Change-Over Flow Tube, and in addition to permitting segregated production as mentioned above, production of both zones through the tubing may be secured without removing the tubing string from the well.


When it is desired to suspend the tubing in tension, in a single or dual-zone completion hook-up using one Packer, the No Left Turn Latching Sub is employed.
Multi-V Tubing Seal Nipple
Perforated Production Tube with Coupling
The Tubing Seal Nipple Locator Sub is employed when it is desirable to apply "set-down" weight of the tubing string in single or dual zone Packer hook-ups.
Lead Seals prevent flow of the Packing Element between the Body and the Cone.
Opposed Slips prevent movement of Packer either up or down.
Lead Seals prevent flow of the Packing Element between the Cones and the Casing I. D.
Multi-V Tubing Seal Nipple
Perforated Production Tube with Coupling

Left—Baker Retainer Production Packer with No Left Turn Latching Sub.

Right—Baker Retainer Production Packer with Tubing Seal Nipple Locator Sub.

GET ALL DETAILS

If you have any production problems which might be solved by the use of a Baker Model "D" Retainer Production Packer, we suggest you contact the nearest Baker representative; or address mail inquiries to Baker Oil Tools, Inc., Box 2274, Terminal Annex, Los Angeles 54, California, U.S.A.

BAKER OIL TOOLS, INC.
Houston · Los Angeles
New York

Retainer Production Packer

Product No. 415-D

produced in the world during 1947.

The U. S. still has the greatest concentration of proved reserve, with its 21,718,302,000 barrels representing 35 percent of the world's backlog of crude petroleum, although the Middle East area, taken as a whole is a close second. During 1947 exploration and development in the U. S. resulted in discovery of reserves sufficient to support a record production of 5,077,167 barrels daily and still contribute a net increase of nearly 1 billion barrels of crude reserve. At 1947 rates of withdrawal, the position as regards ratio of reserves to production has decreased slightly, each barrel of production being backed by 11.7 barrels of reserve. This compares with a ratio of 12.3 to a year ago.

Most Important Discovery

Undoubtedly the most important discovery of the year was a deep Ellenburger pay discovery in West Texas which, because of thickness of pay section and estimates of areal extent, gave rise to estimates that it would eventually prove to be a reserve of perhaps ½ billion barrels. However, nothing like this amount can be placed in the proved category, and WORLD OIL's estimate of its proved reserve to date is purely nominal, although its future importance is not minimized. A steadily active exploratory campaign has produced satisfactory results despite the natural dimunition in discovery ratios to be expected in a nation where so much of its favorable territory has been so intensively prospected. Every indication points to another active exploratory year.

Elsewhere in North America, concern as to the decline in Canada's Turner Valley field was partially dispelled by opening of the Leduc field, conservatively estimated to contain about 50 million barrels reserve. Development and exploration elsewhere in Canada is believed to have balanced withdrawals with the result that Canada shows a net increase to 200 million barrels, less than one-third of 1 percent of the world's reserve, but of great importance to a large consuming nation which is presently importing most of its requirements.

Mexico, according to recent estimates by Pemex engineers, now has slightly more than 1 billion barrels reserve. There have been some expansions of estimates in Poza Rica field during the year, as well as proving up new reserve in El Plan and other Isthmus fields. However, Mexico's rising consumption and high production rates are causing concern on the part of the nation, and an ambitious exploratory campaign is now being mapped.

Second only to the U. S. in success of oil-finding during the year is Venezuela. Despite an increase of 50 million barrels in annual production, sufficient new reserve was proved to add a net of 1,350,000,000 barrels to its reserve, bringing the total to 8,350,000,000 barrels at the close of the year. A notable development was definition of the extent of the new reserve proved by extension and deeper drilling in Quiriquire, oldest field in Eastern Venezuela, where this drilling, which opens up new areas in the original pay, has doubled the reserve, and shallow drilling depths, coupled with convenient transportation, makes it rapidly available.

Western Venezuela, long the principal source of crude from that country, continues to add to its reserves. Extension and stepout drilling in the Lake Maracaibo fields accounting for addition of much new proved reserve, while extremely important expansion in the Cretaceous limestone pay fields has accounted for another 250 million barrels in addition to the already substantial reserves of these areas. Here again the additional reserve is important in this time of mounting world demand since wells producible at near Middle East rates are convenient to transportation and refining facilities. At 1947 rates Venezuela's reserves are being produced at a ratio of 19.2 to 1. The country contains 13 1/5 percent of the world's reserves and contributes 14½ percent of its production.

Elsewhere in South America no important revisions have been made in reserve estimates. Argentina, one of the heaviest users of petroleum products, has not been finding much oil in recent years, and its proportion of imports is steadily rising. Development of a new field at Caleta Olivia in southern Argentina is believed to have proved sufficient reserves to offset production during the year, and its present reserve of about 275 million barrels is being produced at a ratio of 12.8 to 1. Contracts with an American firm for the drilling of 40 wildcat wells, effective late in 1947, should result in eventual establishment of additional reserve from the great unexplored areas of favorable oil territory.

Iran's Reserves

In the Middle East country of Iran, completion of the first producer in the new Lali field indicate that new reserves actually proved in the area have offset the 152-million barrel production. Reserves actually believed to be proved and producible in Iran are estimated at 5,625,000,000 barrels, or 9 percent of the world total. Restriction of outlet to transportation and refining facilities holds the production to slightly more than 5 percent of the world total, with each barrel of production backed by 40 barrels proved reserve. In addition, another 1 billion barrels reserve in Iran is indicated and quite probable, but not considered proved by the drill.

One of the most controversial areas from standpoint of reserve is Kuwait, where Burghan, the sole oil field, is estimated to contain from 9 to 10½ billion barrels, proved and indicated. However, good authorities think no more than half of this should be considered as proved on the basis of drilling to date. A concentrated drilling program with eight rigs now in the country, and more planned for this year, should result in rapid evaluation of the full potentialities of the field. Here restricted transportation outlet is holding the field to a reserve-production ratio of 252 to 1.

Iraq, Saudi Arabia

Iraq, now held to production of less than 90,000 barrels daily until new pipe line outlets are provided, has increased its reserve during the year, having now 5 billion barrels proved and another billion indicated and a producing ratio of 157 to 1.

Saudi Arabia, which will eventually rival Kuwait in reserve, has a proved reserve amounting to 3.6 billion barrels with another 2 to 2½ billion indicated and probable. It should have ten rigs running through most of 1948 and prove much additional reserve. Its output now is second to Iran in the Middle East, having produced more than 89 million barrels in 1947.

All told, the Middle East, looked to as the source of crude to meet the added demand of soaring consumption in the future, has proved reserves amounting to 31.5 percent of the world total, but through lack of adequate transportation (now being built or planned) is furnishing only 10 percent of the world's supply. With full development it likely will have more than 40 percent of world reserves, and can produce at high rates from a comparatively few wells.

Elsewhere in the world no material change in reserves has been noted. Most of the European nations called upon previously proved reserves for 1947 production without sufficient development to replace them. Excluding Russia, the 12 producing countries of Europe, including Great Britain, hold only about 1¼ percent of the world total, and three-fifths of that is situated in Roumania, which is believed to have made some slight additions through an increased drilling program.

Associations

GULF COAST AIME OFFICERS—Among new and retiring officers of the Gulf Coast Section, AIME, are, front row, left to right, A. B. Stevens, director; Frank Briggs, director; A. W. Waddill, director; Harold Decker, retiring chairman; George L. Nye, chairman; J. M. Jennings, director. Back row, E. B. Miller, Jr., program chairman; Mercer Parks, director; H. M. Krause, director; Ralph W. Wilson, director; and Owen Thornton, director.

Nye Named Vice Chairman of Gulf Coast AIME Section

George L. Nye, vice president of the City National Bank of Houston and former secretary-treasurer of the Gulf Coast AIME, was elected chairman of the section at Houston January 20. He succeeds Harold Decker.

A. S. Parks, independent petroleum engineer and geologist, was elected vice chairman, as was Dr. George Fancher, professor of petroleum engineering at the University of Texas, and A. B. Stevens, professor of petroleum engineering at Texas A. and M. Fred Nelson of the Texas Gulf Sulphur Company was named secretary-treasurer.

New directors named were H. M. Krause, Humble Oil & Refining Company; Ralph W. Wilson, Baroid Sales Division, National Lead Company; and Owen Thornton, The Texas Company.

H. G. Doll of Schlumberger Well Surveying Corporation spoke on "Theoretical Analysis and Principles of Interpretation of the SP log."

Petroleum Exposition to Be Classroom for Students

Mounting interest in the International Petroleum Exposition and Congress, May 18-25 at Tulsa, as a classroom for advanced students in scientific and engineering courses was noted last month by William B. Way, general manager of the exposition.

Student groups who can in any way benefit from visiting the exposition will be admitted free to the silver anniversary oil show by authority of the executive committee, headed by W. G. Skelly, president of the exposition since 1925.

"Many college instructors who have written to our officers don't yet know of the big educational bonus planned for them by the IPE scientific and technical committee," Way declared. "Under the direction of Dr. B. B. Weatherby, internationally known geophysicist of Tulsa and chairman of the IPE scientific and technical committee, many of America's top oil scientists are collaborating on exhibits for the 1948 IPE Hall of Science. This will be the most comprehensive museum the oil industry ever assembled. It will house many visual and dramatic petroleum presentations from all over the world. All of the exhibits will show how indispensable oil has become in our life and times."

More than 100,000 oil men's courtesy tickets have been sold. The tickets are used by exhibitors to build attendance for their displays at the exposition. Exhibitors are allowed to order all they need for promotional purposes.

Homer Thornhill Named Head Of Houston Nomads Chapter

Homer Thornhill of Thornhill-Craver Company was elected president of the Houston Chapter of Nomads.

Other officers elected were Furniss Prell, Hughes Tool Company, vice president; Jack Barnes, Trinity Portland Cement Company, secretary-treasurer; Dick Winder, Well Equipment Manufacturing Corporation, assistant secretary-treasurer; Bill Griffin, Baker Oil Tools, sergeant-at-arms; Ed Fontaine, National Tank Company, assistant sergeant-at-arms; and Charles E. Richards, Gray Tool Company, and Luke Clausel, A-1 Bit & Tool Company, regents.

Point Barrow Discussed

Marshall Fagin of Dallas addressed the student section of the AIME at the University of Texas. He spoke on his trip last summer to Point Barrow, Alaska, to inspect the government naval oil reserves development. The talk was supplemented with movies in technicolor and colored slides.

T. J. Fuson Named Chairman Of Houston Chapter API

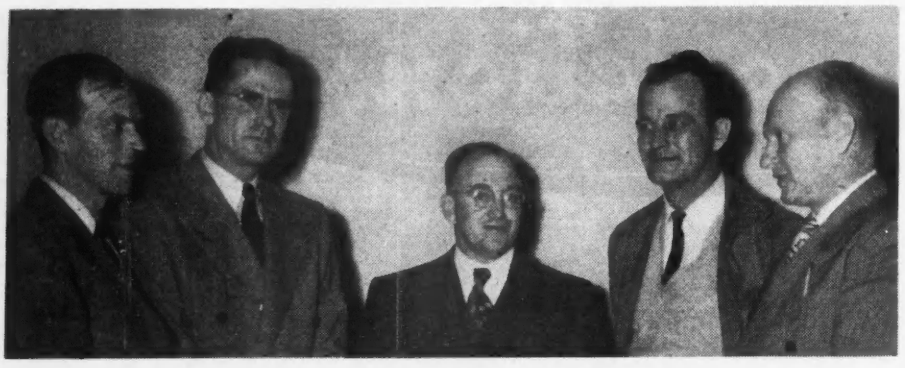
T. J. Fuson, Gulf Coast district petroleum engineer, Humble Oil & Refining Company, was elected to succeed J. U. Teague, Hogg Oil Company, as chairman of the Houston Chapter, API, at the chapter's January meeting in Houston. Charles Thornhill, Thornhill-Craver Company, Inc., was elected first vice chairman, and John Payne, Shell Oil Company, was made second vice chairman. Orien van Dyke, Magcobar, was succeeded as secretary-treasurer by Ralph Smith of Dowell Incorporated.

Teague automatically became chairman of the advisory board for one year. E. Paul Hubbard of Gulf Oil Corporation was elected to the advisory board to serve for one year, as was John Domercq, chief engineer, Standard Oil Company of Texas, and Carlton D. Speed, Jr., independent operator. Those elected to the advisory board for two years were: J. E. (Ed) Bailey, Tidewater Associated Oil Company; A. W. Waddill, Houston Oil Field Material Company; E. P. Hayes, The Texas Company; and Byron Meredith, Meredith, Clegg & Hunt.

Jim Gosline Again Heads Petroleum Pioneers Group

For the third successive year J. E. (Jim) Gosline, Standard Oil Company of California, has been elected president of Petroleum Production Pioneers, fast-growing organization of veterans of the producing and supply branches of the oil industry in the west.

Other officers and directors: vice president, E. L. Decker, Martin-Decker Corporation; secretary, Richard Sneddon, *Petroleum Engineer;* sergeant-at-arms, O. W. Morgan, Jr., Byron Jackson Company; historian, Ted Sutter, Baker Oil Tools, Inc.; publicity chairman, H. H. Roberts, Standard of California.



LINDSAY API CHAPTER FORMED—The Golden Trend Chapter, Division of Production, American Petroleum Institute, was formed with 148 charter members last month at Lindsay Okla. The chapter is in Oklahoma's most active area, including Grady and Garvin counties. Officers, left to right, are Paul Myers, Mid-Continent Supply Company, secretary-treasurer; A. K. Hood, Sohio Petroleum Company, first vice chairman; W. E. Best, The Ohio Oil Company, chairman; Clift Wise, Kerr-McGee Oil Industries, third vice chairman; Ned Biffle, B. and B. Drilling Company, second vice chairman. Officers not in the picture are Guy Barrett, Warren Petroleum Corporation, fourth vice chairman, and James Wise, Cities Service Oil Company, fifth vice chairman.

Middle East Oil Among Topics Planned at AIME Meeting

Petroleum transportation, Middle East oil, and the conversion of coal to gas and oil constitute the economics discussion that will feature the Petroleum division program during the 1948 annual meeting of the American Institute of Mining & Metallurgical Engineers at the Pennsylvania Hotel, New York City, February 15-18.

Frank A. Howard, New York consultant who until recently was president of Standard Oil Development Company and vice president of Standard Oil Company (N. J.), will cover developments in the gasification of coal to obtain liquid hydrocarbons. M. G. Gamble, general manager of Standard Oil Company (N. J.) Marine department, will present "Petroleum Transportation—with Special Reference to Tankers," and C. J. Bauer, head of the same company's foreign economics division, will talk on "The Place Middle East Oil Will Occupy in World Markets." H. J. Struth, Dallas, chairman of the committee which arranged the economics program, and J. E. Heston, of Petroleum Advisers, Inc., New York, will be associate chairmen for the session, which will be held on the afternoon of February 17.

Reports on worldwide production and major developments during 1947 will be given on the morning of February 17 by 11 regional experts who will employ data compiled by 66 state, district, or foreign-country analysts. The regional reports will be given as follows: North America except U. S., G. S. Hume; Northern South America, A. J. Freie; Southern South America, A. A. Curtice; Middle East, J. Terry Duce; Europe, Ray P. Walters, and India and Indonesia by E. W. Berlin. Domestic regions will be reported by E. P. Hayes, Southern U. S.; Robert J. Beams, Mid-Continent; R. M. Larsen, Rocky Mountain, and G. E. Eddy, Eastern U. S. This statistical and development discussion has been arranged by a production review committee under E. G. Dahlgren, Interstate Compact Commission, Oklahoma City, and D. V. Carter, Magnolia Petroleum Company, Dallas.

A production technology program on the morning of February 18 features Henri G. Doll, Schlumberger Well Surveying Corporation, Houston, on theoretical analysis and principles of interpretation of the spontaneous potential log; C. F. Weinaug, University of Texas, on revaporization of retrograde condensate from sand, and J. N. Breston and Richard V. Hughes, Penn Grade Crude Oil Association, on pressure and recovery in long core water floods. Associate chairmen for this meeting will be John H. Murrell, DeGolyer and MacNaughton, Dallas, the Petroleum division officer in general charge of the entire meeting, and Paul Fitzgerald, Dowell Incorporated, Tulsa.

The Petroleum division dinner on February 17 will have as its principal speaker J. E. Brantly, president of Drilling and Exploration Company, Dallas, who will speak on "Development of Natural Resources in Foreign Countries." This dinner will mark the installation of Petroleum division officers for 1948. They are I. W. Alcorn, The Pure Oil Company, Houston, chairman; Carlton Beal, consultant, Los Angeles, and Paul Fitzgerald, Dowell Incorporated, dent of Continental Consolidated Cor- Tulsa, as vice chairman. Members of the executive committee, in addition to the officers, will be Howard C. Pyle, presiporation, Long Beach, the outgoing chairman; W. V. Vietti and S. E. Buckley, Houston; W. W. Porter II and John Sherborne, Los Angeles; John Murrell, Dallas; and Benjamin C. Craft, Baton Rouge, La.

Editorial Index to 1947 Issues Now Available . .

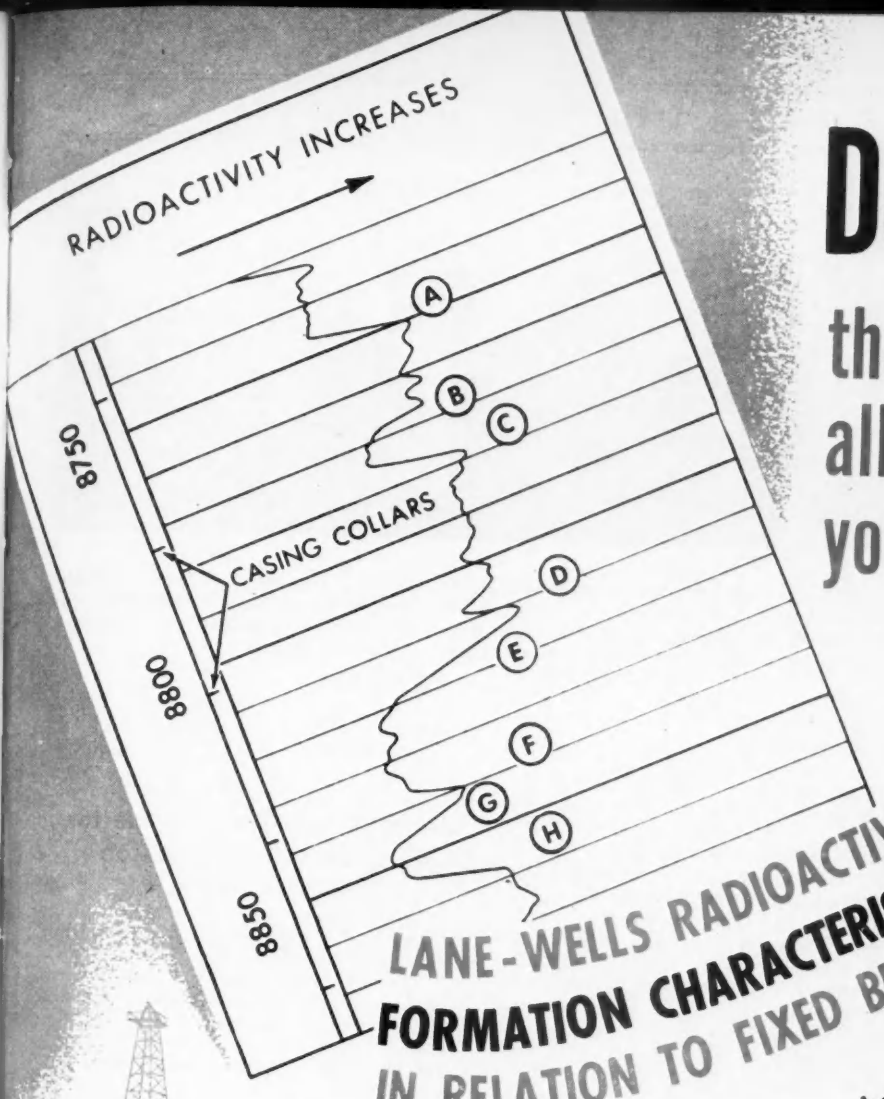
The complete editorial index covering all issues of *The Oil Weekly* and WORLD OIL published during 1947 has been prepared and is bound separately in convenient pamphlet form. It will be sent without charge, of course, to all subscribers who need and request copies.

Requests should be addressed to the Circulation Department, Box 2608, Houston 1, Texas. Please mail requests immediately.

THE OIL MAN'S CALENDAR

FEB. 15–19	American Institute of Mining and Metallurgical Engineers, Annual Meeting, New York, Pennsylvania Hotel.
16–17	Kansas Oil Men's Association, Annual Meeting, Wichita.
MAR. 9–10	Wisconsin Petroleum Association, Milwaukee, Schroeder Hotel.
12–14	Texas Independent Producers and Royalty Owners' Association, Annual Meeting, Corpus Christi.
24–26	Natural Gasoline Association of America, Annual Meeting, Ft. Worth, Texas Hotel.
24–26	Southern Gas Association, Galveston, Texas.
24–26	American Petroleum Institute, Mid-Continent District, Wichita - Kansas, Broadview Hotel.
APRIL 5– 8	National Association of Corrosion Engineers, Annual Meeting, St. Louis, Hotel Jefferson.
6	American Association of Oil Well Drilling Contractors, Directors' Meeting, New Orleans.
6–7	Michigan Petroleum Association, Annual Spring Convention, Detroit, Detroit Leland Hotel.
8–10	Mid-West Gas Association, Annual Meeting.
14–16	American Petroleum Institute, Southwestern District Meeting, San Antonio, Plaza Hotel.
21–23	National Petroleum Association, Cleveland, Hotel Cleveland.
25–27	Independent Petroleum Association of America, Mid-Year Meeting, Wichita, Kansas, Broadview Hotel.
26–29	American Association of Petroleum Geologists, Society of Economic Paleontologists & Mineralogists, Society of Exploration Geophysicists, Annual Meeting, Denver, Shirley-Savoy Hotel.
28–30	Liquefied Petroleum Gas Association, Annual Convention and Trade Show, Kansas City, Mo.
MAY 4– 5	American Gas Association, Natural Gas Department, Annual Spring Meeting, Houston, Rice Hotel.
6– 7	American Petroleum Institute, Pacific Coast District Meeting, Los Angeles, Biltmore Hotel.
15–22	International Petroleum Exposition, Tulsa.
27–28	Natural Gas & Petroleum Association of Canada, Niagara Falls, Ont., General Brock Hotel.
JUNE 30 July 2	American Petroleum Institute, Eastern District Meeting, White Sulphur Springs, W. Va., Greenbrier Hotel.
JUNE 30 July 3	Canadian Gas Association, Annual Convention, Jasper, Alberta, Jasper Park Lodge.
SEPT. 15–17	National Petroleum Association, Atlantic City, N. J., Hotel Traymore.
OCT. 4– 9	American Gas Association, Atlantic City.
NOV. 8–11	American Petroleum Institute, Annual Meeting, Chicago, Stevens Hotel.

Nomads Chapter monthly meetings: **Los Angeles**, second Wednesday, Jonathan Club, B. M. Landis, Secretary. **Houston**, second Monday, Houston Club, Harry E. Estes, Secretary, Telephone Charter 4-7611. **Dallas**, L. A. Little, Secretary, Telephone Justin 8-1726. **Tulsa**, third Wednesday, Hotel Tulsa, Anthony Gibbon, Secretary, Telephone 3-1844. **New York**, first Monday, Louis Sherry's, Norris Boulden, Secretary, Telephone WIckersham 2-1311, extension 260.



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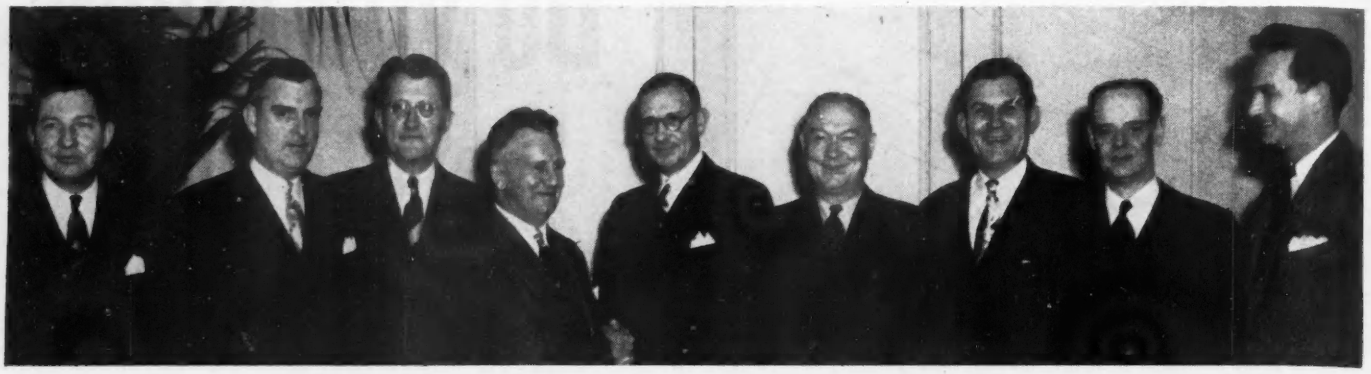

NEW YORK NOMADS OFFICERS—A. V. Simonson (fourth from left), retiring president of the New York Chapter of Nomads, congratulates Val R. Wittich, Jr., incoming president. Officers of the chapter, left to right, are Stewart D. Beckley, secretary; Henry J. McAdams, vice president; James W. Reed, regent; Simonson, regent; Wittich; W. D. Robinson, sergeant-at-arms; Russ V. McIntire, assistant secretary; Joseph B. Roberts, Jr., treasurer; and Charles P. MacDonald, Jr., assistant treasurer. Marvin D. Rasher is assistant sergeant-at-arms.

Arrangements Made for Pacific Coast API Meeting, May 6-7

The Pacific Coast District of the American Petroleum Institute will hold its annual spring meeting May 6 and 7 at the Biltmore Hotel, Los Angeles, it was announced by E. V. Watts, chairman of API's Division of Production on the West Coast.

Lot Bowen of Western Gulf Oil Company general chairman for the two-day affair, said morning and afternoon sessions will feature technical papers by industry engineers on oil well drilling and producing operations, as well as papers of general interest to the industry.

Those named by Bowen to handle all preparations for the meeting are as follows:

Production session program committee: M. B. Standing, California Research Corporation, chairman; J. E. Sherborne, Union Oil Company, vice chairman; R. H. Smith, Signal Oil & Gas Company; Oran Graybeal, Barnsdall Oil Company; C. R. Dodson, University of Southern California; George Laurent, Standard Oil Company of California; C. F. Gates, General Petroleum Corporation; Dean Sheldon, consultant; W. R. Warner, Jr., Conservation Committee of California Oil Producers.

Drilling session program committee: O. W. Chonette, The Texas Company, chairman; J. N. Gregory, Shell Oil Company, vice chairman; F. L. Wadsworth, General Petroleum Corporation; D. S. Johnston, Signal Oil & Gas Company; R. W. Marshall, Drilling & Exploration Company; R. J. Stephens, Kern Oil Company; J. S. Surfluh, Standard Oil Company of California.

Arrangements committee: I. B. Doyle, Hydril Tool Company, chairman; W. C. Brooks, Byron-Jackson Company, finance; D. J. Hall, McCullough Tool Company, acommodations; J. A. Moore, Oil Base Inc., ticket sales; J. W. Davis, The Texas Company, publicity; and L. C. Thomas, Western Gulf Oil Company, preprints.

Arrangements Being Made for Drillers' Session in Houston

Houston will be the site of the 1948 convention of the American Association of Oil Well Drilling Contractors during the first half of October, it was decided by officers and directors at Dallas. Exact dates of the convention will not be chosen until Houston hotels can determine when they will be able to receive the 800 delegates and guests expected at the meeting. Lester D. Cain of L. D. Cain Drilling Company and head of the Houston chapter of the association, is making appointments to the committee on arrangements for the session.

Following the Dallas directors' meeting, a reception was held at the Houston club in honor of E. C. Brown, head of the Brown Drilling Company of Long Beach, Calif., and president of the national association. About 400 attended.

Mark D. Gilbert Named Head Of Tulsa Nomads Chapter

Mark D. Gilbert, Rockwell Manufacturing Company, was elected president of the Tulsa Nomads, succeeding Stanley Wilcox, Seismograph Service Corporation, who was advanced to the post of regent.

Other officers for 1948 include K. O. Hoevel, The National Supply Company, vice president; John Pearce, manufacturers representative, secretary; Oscar B. Irizarry, *Oil and Gas Journal*, assistant secretary; J. Murray Walker, Lane-Wells Company, treasurer; H. J. Wollslayer, Lee C. Moore Company, assistant treasurer; B. E. Groenewold, Bethlehem Supply Company, sergeant-at-arms; Neal Harris, Continental Supply Company, Assistant sergeant-at-arms; Henry A. Bourne, Republic Steel Corporation, regent.

Crake Addresses AIME

W. S. Crake, regional chief mechanical engineer, Shell Oil Company, Houston, spoke before the Delta Section AIME at New Orleans.

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Men in the Industry NEWS

R. G. McIntyre, president of Standard Oil Company of Texas, was elected chairman of the board of directors for Col-Tex Refining Company. He succeeds **F. S. Bryant** of San Francisco, resigned. **M. P. Paret, Jr.,** of El Paso was named to the board of directors and the executive committee to fill the vacancy created by the resignation of **E. R. Peterson** of San Francisco. **H. L. Smith** of Houston was named a director to take the place vacated by Bryant. **L. W. Clark** of Houston was chosen assistant secretary to take the place of **C. M. Foster** of San Francisco.

»

B. B. Howard, a director of Standard Oil Company (N. J.), was awarded the Certificate of Merit by **President Truman** for "outstanding fidelity and meritorious conduct against the common enemies of the U. S. and its Allies in World War II. Howard went to England in 1941 to help expedite tanker turnarounds in British ports and speed deliveries of oil from the U. S. In 1942 he went to India and the Suez area as a representative of the War Shipping Administration on the British-American mission to speed cargo movements of war materials to India and the Middle East.

»

E. D. Cumming, who succeeds **A. J. Galloway** as regional vice president of Shell Oil Company at Houston, has arrived to assume his responsibilities.

»

J. L. Kennard of Evansville, Ind., has announced his candidacy for Congress on the Republican ticket. He is president of Kennard Oil Company and was the discoverer of the Birk City, Ky., pool in 1938.

»

J. R. McWilliams, Tulsa, has been appointed executive vice president of The Carter Oil Company. McWilliams has been vice president in charge of production since August, 1945, returning to Carter at that time after a year's leave of absence during which he served as director of the production division of PAW. He succeeds to the post vacated by **John W. Brice,** former executive vice president, who in June, 1945, left Carter to become assistant coordinator of production for Standard Oil Company (N. J.) A native of Missouri, McWilliams was graduated from the University of Michigan in 1919 as a petroleum engineer.

»

Thomas E. Sunderland, general counsel of Pan American Petroleum and Transport Company, has been elected to the board of directors and executive committee. His election fills the vacancy on the board left by the late **Buell F. Jones** of Chicago.

R. G. Follis, president of Standard Oil Company of California since 1945, has been named to a new office of vice chairman of the board of directors. He is succeeded as president by **T. S. Petersen,** vice president and director. Follis, a graduate of Princeton University, began work with Standard of California in 1924 at its Richmond refinery. After service both in Bakersfield and El Paso, he returned to San Francisco in 1932,

T. S. Petersen

R. G. Follis

and in 1940 was made general manager of the manufacturing department. He was elected to the board in 1942 and advanced to the presidency in 1945. Petersen's career with the company started in 1922 at Portland, Ore., and has been largely identified with marketing activities prior to becoming manager of the Employe Relations and Personnel department in 1938. Later he was general manager of sales, and in 1942 was elected to the board. Since then he has been associated with general administrative duties in the company.

»

Theodore C. Coleman, formerly an official of the Northrop Aircraft, Inc. was named assistant treasurer of Standard Oil Company of California. Coleman was graduated from the California Institute of Technology in 1926 and for the three following years worked as an engineer. In 1929 he joined the financial house of Blyth and Company in Pasadena. The following year he became associated with the investment firm of Banks-Huntley in Los Angeles. In 1940 he became secretary of Northrop Aircraft and a year later was elected director and vice president in charge of finance. For the past two years he has been in Brazil as representative for several U. S. aircraft manufacturers.

Theodore C. Coleman

»

Andrew Neilson has been named president of Overseas Tankship Corporation, an affiliate of California Texas Oil Company.

L. Murray Neumann, Tulsa, consulting geologist of the exploration department for The Carter Oil Company, has retired. Neumann was employed by Carter in 1916 as one of its first geologists. In 1918 he became chief geologist, holding this position during the period in which Carter acquired and developed important properties in the Burbank, Cromwell, and Seminole fields. After being chief geologist for 16 years, Neumann in 1934 became consulting geologist for Carter exploration activities, in which capacity he has served until the present time.

»

George Dunaway, formerly in the geological department of Phillips Petroleum Company, has joined the Blackwell Oil and Gas Company at Shawnee, Okla.

»

James C. Cordell has joined the petroleum engineering staff of Stanolind Oil & Gas Company at Oklahoma City.

»

Ralph H. Fash, consulting chemist, has sold his interests in The Fort Worth Laboratories, Southwestern Laboratories and Houston Laboratories and has opened an office as consultant on chemical problems in the W. T. Waggoner Building, Fort Worth.

»

J. F. Anderson of Houston was named head of the Geophysical department of Warren Oil Corporation with headquarters at Houston. Anderson formerly was chief geophysicist for Geophysical Engineering Company of Tulsa and prior to that was a member of the Geophysical department of Sun Oil Company, which he joined in 1933. Prior to his resignation from Sun in January, 1945, he was supervisor in charge of seismic operations and interpretations for the Gulf Coast and Mid-Continent districts.

»

Conger Reynolds, Standard Oil Company of Indiana, has received an award from The National Association of Public Relations Counsel for doing the most to improve the techniques and application of public relations through top-flight proficiency from the professional standpoint during 1947.

»

H. L. Schultz, vice president and director of Standard-Vacuum Oil Company, has retired after 36 years of service. Schultz joined the Standard-Vacuum organization as a foreign service trainee in 1911 and spent about 30 years in Far Eastern marketing operations before returning to New York to become a director in December, 1941, and vice president in January, 1944.

»

M. A. Wright of the Standard Oil Company (N. J.) Producing department, has been named a director of Interstate Oil Pipe Line Company. Wright formerly was chief engineer for The Carter Oil Company at Tulsa. He succeeds **J. W. Brice,** who was promoted to Coordinator of Producing Activities.

MEN IN THE INDUSTRY NEWS

Transfers:

James Lewark, geologist with The Carter Oil Company, transferred from Centralia, Ill., to Ft. Smith, Ark., for special work in western Arkansas and east-central Oklahoma . . . **C. J. Harvey,** district geophysicist for The Atlantic Refining Company at Jackson, Miss., to Tulsa as district geologist for Kansas and northern Oklahoma, succeeding **Bill Sloniger,** who has resigned to become a consultant . . . **H. L. Spyres,** district geologist for Skelly Oil Company at Jackson, Miss., transferred to Corpus Christi, Texas, and replaced by **Charles E. Buck** of the Jackson staff . . . **R. F. Wyly** of Tulsa to Oklahoma City to become division superintendent of industrial relations for Stanolind Oil & Gas Company, succeeding **Ed Wickhorst,** who has been moved to Tulsa.

»

J. A. de Lanoy, vice president and manager of the Materials department for Asiatic Petroleum Corporation, has retired from active duty after serving the firm for more than 25 years. He has been succeeded by **S. J. Veenstra.**

»

Don E. Gilman, executive vice president of Western Oil and Gas Association, has been appointed to the National Petroleum Council. He replaces **Ralph B. Lloyd,** association president who recently resigned from the council.

»

C. A. Blanchard has been made chief engineer of Houston Natural Gas Corporation. He joined the firm in 1944 after 13 years with the Lone Star Gas Company, Dallas, and two years with the Austin Company, Houston.

»

J. B. Storey, former district geologist for United Gas Company at Jackson, Miss., has been named assistant district manager at New Orleans and has been succeeded in Jackson by W. H. Knight.

»

A. Ten Dam has been appointed chief paleontologist of the Societe Nationale de Recherche et d'Exploitation des Petroles en Algerie, government-sponsored company, which is doing intensive exploration-work in Algeria. Dr. Ten Dam received his doctor's degree in geology and paleontology from Utrecht State University, Netherlands and served as chief micropaleontologist in the Netherlands State Geological Survey at Haarlem from 1940 to 1946.

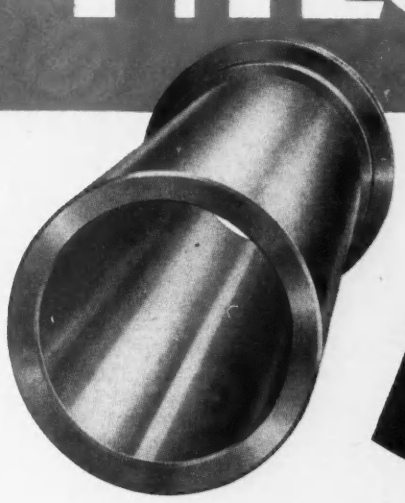
»

C. W. Overton of Tulsa, veteran of 22 years with Standard Oil Company (N. J.) affiliates, has been elected vice president and director of The Carter Oil Company in charge of its marketing department, succeeding **F. W. Butler** who was moved to New York City to serve in a marketing capacity with Jersey Standard.

»

Dr. E. P. Luongo has been named medical director of General Petroleum Corporation. In addition to several years in general practice, he was for seven years assistant medical director of the U. S. Civil Service Commission. He recently was assistant medical director of Pacific Indemnity Company.

FALCON



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FALCON Liners are HONED to a MICRO-FINISH on Falcon specially built machines to insure true concentricity and mirror-smooth surface for long, dependable pumping service.

FALCON Liners are available for every principal make and model of Slush Pump. Send for illustrated bulletin and price list.

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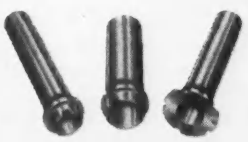

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Empty Space Shows White
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Due to "Reflex" principle, liquid always shows black and empty space white. Liquid level is indicated instantly and unmistakably. Made of temperature resisting alloy steel for high pressure and temperature service. Conforms with API and ASME requirements.

PENBERTHY
TRANSPARENT
Drop Forged Steel Liquid Level
GAGES

Glass front and rear permits observation of color and density of liquids under high pressures and/or temperatures. Highest quality—made of temperature resisting alloy steel. Conforms with API and ASME requirements.

3277-C

PENBERTHY PRODUCTS

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MEN IN THE INDUSTRY NEWS

GULF NAMES EXECUTIVES—E. P. Hubbard (center) was appointed superintendent of production for the Houston district, Gulf Oil Corporation and Gulf Refining Company, effective February 1. He succeeds W. C. Clemons, who retired. J. M. Cooper (left), former chief petroleum engineer in the Houston district, was appointed assistant superintendent of production, succeeding Hubbard, and E. L. Petree (right) was named chief petroleum engineer. Hubbard joined Gulf in 1920 and since 1933 has served continuously as assistant superintendent of production, Houston district, except for a temporary assignment as manager of the Kuwait Oil Company, Ltd., last year. Cooper started with Gulf at Hull, Texas, about 25 years ago. Petree, who is being promoted from assistant chief petroleum engineer, joined the firm in 1935.

C. S. Mitchell of Chicago, has been appointed manager of Cities Service Oil Company's new crude oil purchasing and sales department. Mitchell joined Cities Service in 1930 and his assignments have included work in all of the principal phases of the company's operations, including gas transmission and industrial sales. He was assistant superintendent of Cities Service Gas Company's production operations in the Texas Panhandle and later was promoted to the company's industrial sales department.

»

Commander W. S. Comstock, who for the past two years has been in the Los Angeles office of the Inspector of Naval Petroleum Reserves, has joined Franco Western Oil Company and the Franco Wyoming Oil Company as chief geologist.

»

A. A. Buzzi was named assistant treasurer of Shell Oil Company. Formerly manager of the Accounting department, Buzzi replaces **William H. Garbade,** who recently became president of Deep Rock Oil Corporation, Tulsa. Buzzi started with Shell in 1923 as a timekeeper in the Arkansas City refinery. **J. M. Flaherty,** now manager of the auditing department, will become manager of the accounting department. Flaherty's present position will be filled by **Allen Howard,** present assistant manager of the auditing department, and Howard will be replaced by **W. G. Precobb,** office manager at Shell's Wood River refinery.

»

Dr. Alfred W. Simon, former head of the applied mechanics department at Washington University, St. Louis, Mo., will join the petroleum sciences and engineering college at the University of Tulsa in the spring. Dr. Simon, author of many articles in leading scientific engineering journals, received his B.S. and Ph.D. degrees in physics from the University of Chicago. During the war he served with the naval ordnance laboratory in Washington in the development of magnetic mines.

Stuart D. Watson has been promoted to assistant advertising manager of Standard Oil Company (Indiana). He joined the company in 1939 as advertising clerk in the South Bend, Ind., sales field, where he was a salesman when inducted into the army as a private in 1943. Upon his discharge as a captain in the infantry in 1946 he returned to Standard of Indiana as executive assistant to the advertising manager in the general office in Chicago.

»

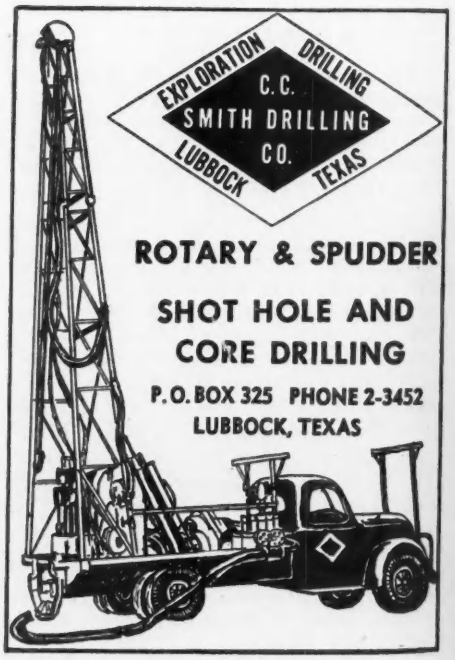
Joseph Zaba of Houston has joined Stanolind Oil & Gas Company at Tulsa as chief mechanical engineer in the Production department.

»

Max A. Robinson has succeeded **Merle Keefer** as scout in North Texas for The Superior Oil Company.

»

Hugh Key has become head of the Land and Geological department at Mid-Con-Continent Petroleum Corporation, Tulsa, succeeding the late **Jess Scarborough.**



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This cooler is corrugated for greater strength and durability being of all welded construction. It is fully insulated with granulated cork to keep water colder longer. Added features include, conversion from spigot to non-spigot type, no solder joints to break out and a reinforced innerbottom.

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Beginning at Petrolia back in 1908 with only a span of mules, our operations during the past thirty-nine years have extended into California, Colorado, Oklahoma, Arkansas, Mississippi, Louisiana, and all of Texas. From Electra, Smackover, Mexia and Burkburnett to the present, our records show more than 2,000 oil and gas wells drilled under every condition. We have helped push derricks higher — and pipe lower, past 12,000-foot levels in the search for crude. We have used everything from the makeshift equipment of other days to our present modern rigs with gasoline, heavy steam, electric and diesel power. The experience we have gained is invaluable and the 250 men in our organization have a knowledge of drilling second to none in the business. We have come a long way in these thirty-nine years and we're proud of our part in helping develop the industry. We look forward to new developments with the same anticipation that we had in 1908.

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Efficient, economical filtration systems for salt water disposal or feed water purification. Standard filtration methods are intelligently applied to assure proper coagulation and crystal clear effluent.

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Under Schimmel Direction
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MEN IN THE INDUSTRY NEWS

James J. Cosgrove, general counsel for Continental Oil Company since 1929, has been named chairman of the board of directors. Born in North Braddock, Penn., and educated at the Pittsburgh Academy, Cornell University and the University of Pittsburgh law school, he was admitted to the bar in 1912 and established a law office at Pittsburgh, where he practiced until 1917, when he entered the Army. After the Armistice he became a member of the War Department Board of Appraisers and subsequently a member of the War Department Claims Board. In 1921 he was appointed special attorney to the Commissioner of Internal Revenue and in 1922 joined the Texas Company, where he acted in a legal capacity until he went to Continental in 1929.

James J. Cosgrove

»

C. L. (Cap) Hand, manager of the Marine department of the Texas Company at Port Arthur, has retired. **J. H. Norville** was named assistant manager of the Marine department's operating division and **F. W. Bucklin** was appointed port engineer at Port Arthur. Hand graduated from the U. S. Naval Academy in 1904, commanded the Brittany Patrol during World War I, and resigned his commission as lieutenant commander in 1920 to join The Texas Company at New York. Assigned the same year to Port Arthur as assistant to the marine superintendent, Southern division, he became superintendent of the division in 1923 and in 1939 was promoted to the position from which he has retired. Norville, who was promoted from the position of superintendent of the Southern division, will be in charge of the department's activities in the South. Bucklin served as chief engineer on various tankers until he went ashore in 1929 as engineer for maintenance of port facilities at Port Arthur.

»

R. H. Sherman has resigned as vice president of Creole Petroleum Corporation to join Standard Oil Company (N. J.) as assistant coordinator of producing activities. He will continue as a director of Creole. **A. Freie,** former production manager for Creole at Caracas, Venezuela, will assume the duties formerly assigned to Sherman as head of the producing section of Creole's New York office. Freie has been associated with Jersey Standard interests since 1929 and has spent the last 17 years in Venezuela in geological and producing activities.

»

Dr. Paul H. Giddens, Allegheny College professor and authority on the history of the petroleum industry, has been granted a two-year leave from teaching duties to write a history of the Standard Oil Company of Indiana.

Dr. J. Bennett Hill and **Dr. John M. Pearson** have been made directors of new divisions in the reecntly-created Research and Development department of Sun Oil Company. Appointment of **Dr. John R. Bates** as director in charge of research was announced previously. A third division was added to the Research and Development department by the transfer of the Patent division from the Manufacturing department. **Robert O. Spurdle** heads the Patent division. Dr. Hill, former manager of the development division of the Manufacturing department, will head a new Chemical and Engineering division. Dr. Pearson, former director of physical research and development of the Production department, will direct a new Physical division.

»

H. H. Arnold, Jr., formerly assistant manager of the Oklahoma division of The Texas Company, has been appointed assistant division manager of the Rocky Mountain division, producing department, with headquarters at Denver. The son of a Pennsylvania oil producer, he was graduated from the University of Pittsburgh School of Mines and joined The Texas Company at Houston in 1927. He was named Oklahoma division geologist in 1938. After almost four years in the U. S. Army where he attained the rank of lieutenant colonel, he returned to Texaco as general superintendent of the Illinois district in January, 1946. He was transferred to Tulsa as assistant division manager in October of that year.

DEATHS

Harry M. Way, 89, pioneer Oklahoma oil operator, died January 7, at Tulsa. He had been active in the oil business from the time he was 18 until he retired in 1935, starting work in the Pennsylvania oil fields for H. L. Taylor Company.

»

Harry T. Russell, 64, Tulsa oil man, died January 7 after a long illness. A native of Findlay, Ohio, he entered the oil business at Lima, Ohio. He had been active with Zephyr Drilling Company, Tulsa, until his retirement in 1946.

»

Bernard A. McKerren, 56, Tulsa, secretary and assistant treasurer of The Texas Pipe Line Company and secretary-treasurer of the Texas-Empire Pipe Line Company and the Kaw Pipe Line Company, died January 21 following a heart attack. He was born in Lima, Ohio, and went to Tulsa in 1910 when he became affiliated with The Texas Pipe Line Company.

»

De Olen Pugh, Byron Jackson Company, Tulsa, died January 11. He went to Byron Jackson Company from Dunn Manufacturing Company, which he joined at Tulsa in 1926.

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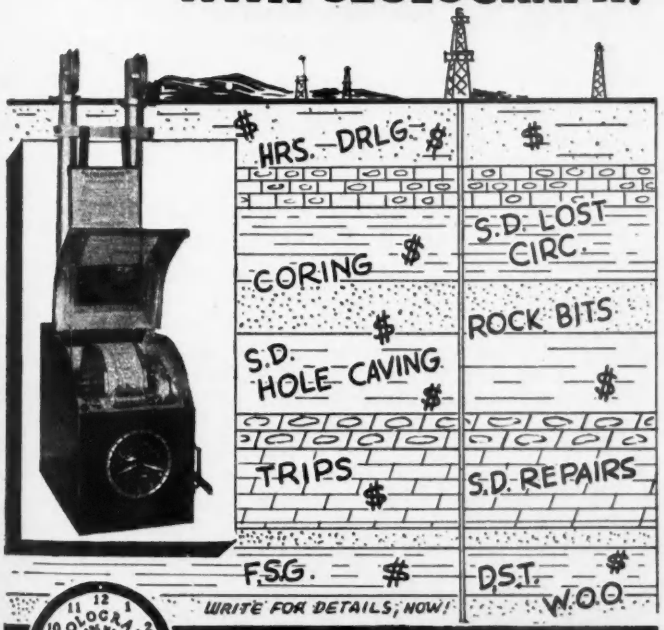

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GUARD YOUR ENGINE'S HEART ZONE

LUBRICATE THE HEAT ZONE

Your engine's heart zone is its heat zone—the top cylinder area. That's where vital valves must work—where heat is hottest, especially in gas-fueled engines—where sizzling temperatures scorch lubricants and leave bare metal unprotected . . . that's where Marvel Mystery Oil and the Marvel Inverse Oiler really go to work!

Marvel Mystery Oil is specifically compounded to resist heat. Here's liquid armor for your engine's heart—this *extra*-tough protective film cleans as it clads! Marvel dissolves sticky gum, sludge and varnish from valves, guides and rings—keeps them cleanly coated.

Your engine throbs with power when lubrication is right. Performance picks up, and "down time" stays down. Ask for the facts. Emerol Mfg. Co., Inc., 242 W. 69th St., New York 23, N. Y.

The Marvel Inverse Oiler, easily installed, proportions the flow of Marvel Mystery Oil precisely to the needs of your engine.

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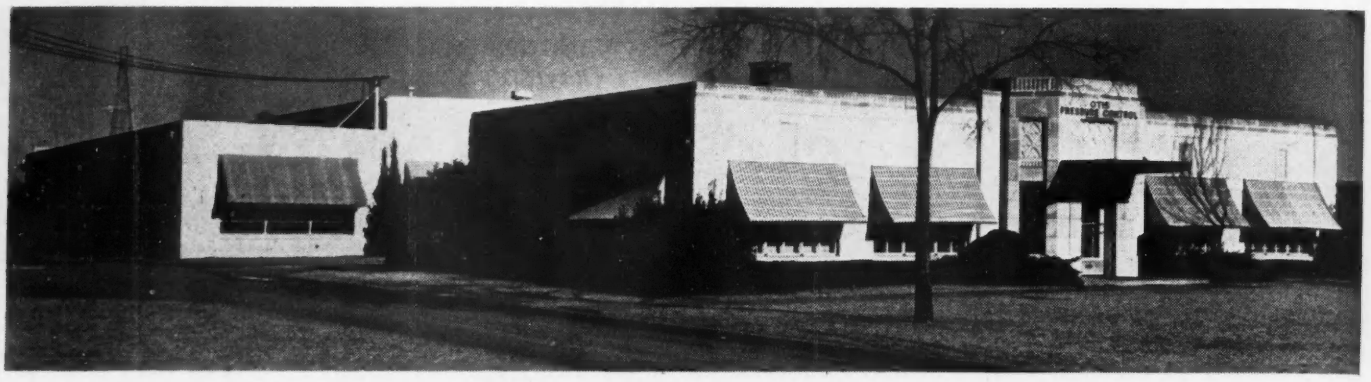
MANUFACTURERS' AND SUPPLIERS' NOTES



OTIS PLANT ENLARGED—The recently completed addition to the plant building of Otis Engineering Corporation, Dallas. The new construction, marked by awnings in front of the rear wing and duplicated on the opposite side, increases usable manufacturing, testing, and shipping space by 138 percent.

Otis Engineering Corporation Completes Construction Program

H. C. Otis, president, announced the completion of a construction program which has increased useable manufacturing, testing, and shipping space for Otis Engineering Corporation, Dallas, by 138 percent, at a cost of approximately $50,000.

Building alterations and additions completed during December, 1947, called for the construction of a separate and enclosed tool room, one of the most completely modern enclosed grinding rooms in the Southwest; a separate tool crib, inspection facilities, and welding rooms. Heating and ventilation systems throughout the building have been rearranged and capacity increased; additional bridge cranes have been installed to service the entire storage, shipping, and receiving area. Wash room, dressing room, and shower facilities have been enlarged, while ventilation and fire protection equipment has been added to the heat-treating department. Modern testing devices have been installed in the testing room.

W. K. Cox Becomes Advertising Manager for Caterpillar Firm

W. K. Cox, assistant general sales manager of Caterpillar Tractor Company, has been named advertising manager, and Gerald M. Walker, who has headed the department since 1941, has retired.

Cox joined Caterpillar in 1928 and served as supervisor of industrial advertising, assistant manager of sales development, district representative in the Southern states, and assistant manager of the Eastern Sales division prior to the war years. At the outset of World War II he transferred to the Merchandise department, thence to the Purchasing department, and in 1943 he returned to the General Sales department. In 1944 he was named assistant general sales manager.

Walker's retirement terminates 33 years with Caterpillar and one of its predecessor companies. He became advertising manager in 1931.

W. K. Cox

J. J. Valentine

Succeeding Cox as assistant general sales manager is J. J. Valentine, Central division sales manager, who has been with the firm since 1929. He has served in General Sales, Purchasing, Treasury and Export Sales departments.

Ferd D. Haberkorn, Sales Training division manager and a member of the sales staff since 1935, succeeds Valentine. His former post goes to J. W. Mohler, assistant Central division sales manager. Mohler is replaced by Herman S. Eberling, Western division district representative.

M. O. Johnston Changes Name of All-Purpose Gun Perforator

A change in name from "Perf-Test" to "Shoot-N-Test" has been announced for M. O. Johnston Oil Field Service Corporation's mechanically-operated hydrostically-fired gun perforator. The term "Shoot-—Test" has been adopted because it well describes the function of the Johnston All-Purpose Gun Perforator as the perforating unit in combined perforating and testing operations and the flexibility afforded in running in on tubing or drill pipe. The change in name has been made to better identify the tool.

Illustrated descriptive literature is available from M. O. Johnston Oil Field Service Corporation, 3035 Andrita Street, Los Angeles 41.

Pittsburgh Sales Manager Named For American Chain Division

Ward C. Whippo has been appointed district sales manager for the Pittsburgh district of Reading-Pratt & Cady Division of American Chain & Cable Company, Inc., with headquarters at 908 Empire Building, Pittsburgh 22.

Reading-Pratt & Cady Division manufactures brass, steel and iron valves and steel fittings.

Whippo, who has been with the company for ten years, succeeds A. W. Taggart, district sales manager for many years who has retired.

E. T. Adams Named Director Of Purchases for Kerotest

E. T. (Kink) Adams has been named director of purchases for Kerotest Manufacturing Company.

Adams was foreign representative for Kerotest for 12 years and previously was purchasing agent for Sinclair Oil Company in Mexico and a member of the material department of Standard Oil Company of Venezuela.

Sales Executive Appointed By U. S. Steel Corporation

Richard F. Sentner has been named assistant vice president of sales for United States Steel Corporation of Delaware. He began his business career with Wheeling Steel Corporation in 1926 and was appointed manager of tin plate sales in 1941. In 1942 he joined the War Production Board and later was appointed deputy director of the steel division. He returned to the Wheeling Steel Corporation as assistant manager of sales in October, 1945.

Hinderliter Manager Named

F. J. Wilbanks, manager at Seminole Okla., for the Hinderliter Tool Company, has resigned to enter the petroleum products marketing business at Seminole. He is succeeded by E. L. Mick, formerly of Houston.

MANUFACTURERS' AND SUPPLIERS' NOTES

General Sales Manager Named By John A. Roebling's Sons

John A. Roebling's Sons Company, Trenton, N. J., manufacturers of wire rope and wire products, through E. C. Low, vice president in charge of sales, announced the appointment of E. George Hartmann as general sales manager.

E. George Hartmann

Hartmann, who brings to his new position over 29 years experience in the wire field, has been associated with Roebling since 1940.

Second National Bank, Houston, Announces Two New Directors

Douglas B. Marshall of the H. R. Cullen interests and W. Howard Lee of Lee Brothers Oil Company have been elected to the board of directors of the Second National Bank, Houston.

The board promoted David Weintraub from assistant trust officer to trust officer and E. C. Edens, Jr., of the trust investment division to assistant trust officer.

Sales Department Appointments Made by American Steel & Wire

Two appointments in the Headquarters Sales Department of American Steel & Wire Company, United States Steel Corporation subsidiary, were announced.

Charles W. Meyers was named director of spring sales in the Manufacturers Products Sales Division. He spent several years as a chemist with American Steel & Wire, he was named instructor in the company's educational department, and later development engineer. During the war he served as special representative on aviation products and in 1946 was named assistant manager of the wire rope and construction materials division.

Edwin T. Eggers succeeds Meyers. He started with American Steel & Wire Company in 1934 after five years with several engineering and construction companies.

He served as a salesman in the company's Philadelphia office for a year, and then in the Chicago district sales office from 1935 until 1943. He has served since that time as the company's special representative in the Mid-Continent fields.

Eagle-Picher President Named To Cleveland Bank Directorate

Joel M. Bowlby, president of The Eagle-Picher Company of Cincinnati, was elected to the board of directors of the Federal Reserve Bank of Cleveland for the unexpired term ending December 31, 1948.

Bowlby, a native of Litchfield, Ill., has been at the head of The Eagle-Picher Company since 1941.

What is the Marshall Plan?

We doubt if even Marshall knows what the Marshall Plan is—now. Certainly we don't.

If it has to do with feeding the hungry and clothing the destitute, the Far East should be our first concern.

If it has to do with buying friendship in Europe, or even a measure of co-operation, it won't work. There are still a few things money won't buy.

If it has to do with bolstering our economy, the gesture should be somehow reversed. We have markets. Production is the thing needed.

If it has to do with creating a political slush fund we take off our hats to the current regime. It's no piker play.

If it has to do with sprouting a new crop of tenacles on our bureaucratic octopus, hand us the electric hedge cutters. And bring on a presidential candidate for whom honest men can vote!

WE'VE SUPPLIED OIL MEN IN OUR AREA FOR 39 YEARS

PELICAN WELL TOOL & SUPPLY CO.

SHREVEPORT
LOUISIANA

PELCO

Berwick
New Iberia
Lake Charles

Three Additions Made to Staff Of Jarecki Manufacturing Firm

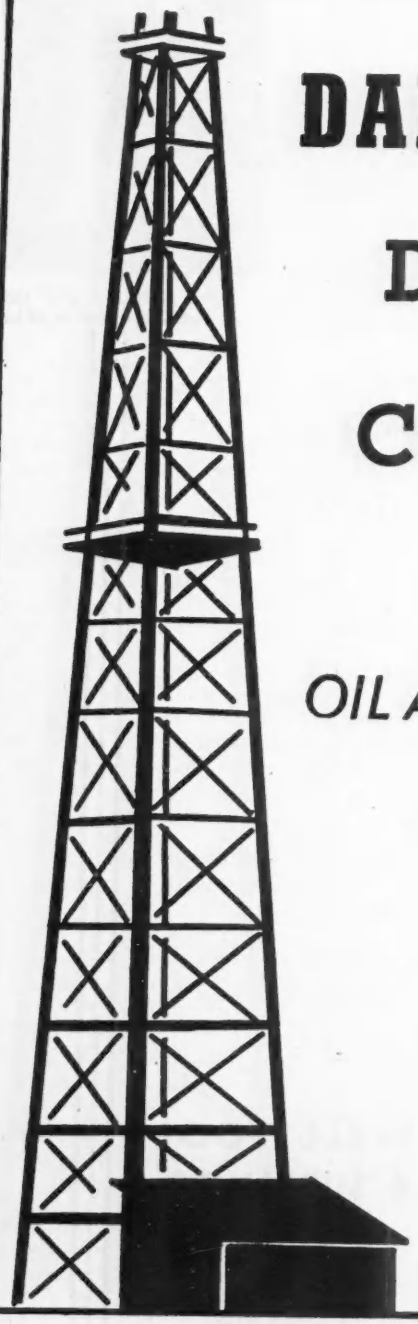
The Jarecki Manufacturing Company has announced three appointments to its oil field supply staff.

Joseph P. Branch has been appointed district manager in South Texas with headquarters at the company's Corpus Christi store. Branch has a background of 20 years in the oil field supply business.

W. B. Reynolds has been appointed manager of industrial sales for the South Texas area, also with headquarters at Corpus Christi. He has been engaged in the oil field supply business for the past ten years and has been active in the Southwest Texas area since 1943.

Sam T. Dyer has been appointed special sales representative with headquarters at the main affice of the company's Oil Field Supply Division at Houston. Dyer has been active in the oil industry, particularly in the Texas Gulf Coast area since his graduation from college in 1929.

DAN L. CLARK W. M. AVERILL RUPERT COX



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COMPANY

Drillers of

OIL AND GAS WELLS

POWER AND STEAM RIGS

WILSON BUILDING

CORPUS CHRISTI, TEXAS

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Manager of Drilling Equipment Sales Named by National Supply

W. R. Ryburn has been appointed manager of drilling equipment sales of the Oil Field Machinery and Equipment division, National Supply Company, according to R. W. Gordon, manager, oil field sales. Ryburn will make his headquarters at Toledo, Ohio. He joined the company in 1928 and served as store man in National Supply's Shelby and Conrad, Mont., stores and as field salesman in the Casper and Cody, Wyo., stores. In 1938, he was transferred to the general sales department at Toledo.

W. R. Ryburn

Upon leaving the University of Michigan, he was employed in the Land and Lease department of The California Company in Montana and worked for various drilling contractors in Montana and Wyoming from 1924 to 1928.

Groustra Heads New Link-Belt Sales Office in Grand Rapids

Link-Belt Company has established a sales office in Grand Rapids, Mich., with headquarters in the Murray Building, 48 Division Street.

Peter Groustra, formerly district sales engineer at Detroit, has been appointed district sales manager in charge of the office.

Groustra entered the company's employ in 1926. He was transferred to the Detroit office as district sales engineer in 1943 and has since then been serving customers in eastern and northern Michigan, including some of the territory that he will now be handling more conveniently out of his new headquarters in Grand Rapids.

He will be assisted by Herbert E. Wolf, who has been a member of the staff of the Link-Belt Ewart plant in Indianapolis since 1934.

GE Establishes New Integrated Operating Unit Management

General Electric's Apparatus Department, largest and oldest manufacturing division of the company, is establishing a new "integrated operating unit form of management to provide for expanded production," it was announced by R. C. Muir, vice president and general manager of the department.

The Apparatus Department, which is responsible for General Electric's capital goods business, is a manufacturer of power-producing and power-consuming equipment for industry, utilities and transportation. The new organization, Muir said, consists of separate operating units, each with a manager responsible for all phases of business, including engineering, manufacturing and sales.

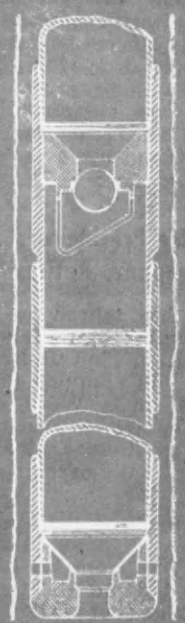
Successful primary cement jobs, jobs with CAMERON-NUWELL

FLO-MASTER SHOES AND COLLARS

Here is the bottom hole cementing equipment that provides the operator with a means for controlling the direction of fluid discharge, a feature which is now generally recognized as a prerequisite for obtaining consistently successful primary cement jobs. There is no "trigger work," slide valve, or other unpredictable mechanism employed. While casing is being run, the *entire* flow of fluid may be pumped downward only, through the nose of the shoe to provide high velocity flow for washing down bridges. When casing has been run to the desired depth, a ball is pumped down to a seat in the shoe to close the axial opening, and to divert the *entire* flow of fluid through horizontal ports, providing high volume flow for scouring filter cake from the walls of the hole and to assure placement of a column of cement entirely around the shoe.

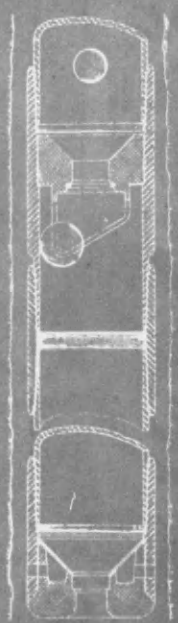
The CAMERON-NUWELL Flo-Master Type Guide Shoes and Float Collars pioneered this innovation in cementing equipment and has six years of outstanding field performance to its credit. Complete details will gladly be sent to any interested operator on request.

Floating Casing or Washing Bridges



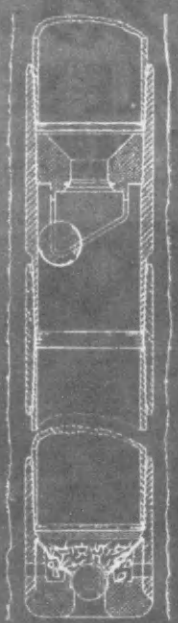
Unlike conventional side outlet shoes, openings around the CAMERON-NUWELL Show *remain closed* until casing is run to the desired depth and the operator wishes to open them. Thus, should a bridge be encountered while going in the hole, it can be washed away more readily because the *entire flow of fluid is directed through the nose of the shoe at high velocity.* This also makes possible the removal of cavings and cuttings which may have settled to the bottom of the hole.

Diverter Ball Passing Through Collar



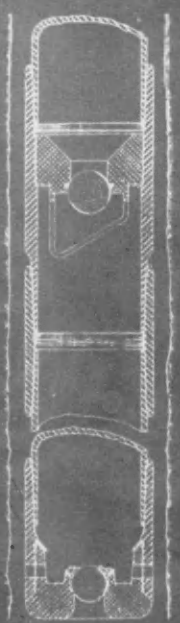
With casing run to the desired depth, a diverter ball is dropped in the casing and is pumped down to its seat in the shoe, thus closing the hole in the nose. The unique design of the back-pressure valve readily by-passes the smaller diverter ball, and minimizes the possibility of plugging the Float Collar. Note that the larger back-pressure valve ball rests out of direct alignment in a slotted cage when pump is running. Fluid continuously rotates the valve ball, keeping it clean and substantially round.

Changing Discharge Direction



When the diverter ball seats in the nose of the shoe, closing the axial flow-way, fluid impact or pressure on the fluid column in the casing causes a plastic diaphragm in the shoe to shatter, thus opening a cylindrical chamber entirely around the inside of the shoe, out of which open lateral discharge ports. These ports have a greater combined area than the hole in the nose of the shoe. (Figure 3 illustrates the diaphragm in process of breaking.) *Now, the entire volume of cement slurry is distributed laterally against the walls of the hole.*

Holding Pressure On The Cement



After cement has been placed and the downward fluid flow has ceased, the buoyant back-pressure valve ball floats to its seat. No back rush of cement is needed to seat the ball. Consequently, when the pump pressure is released, the valve is already closed, resulting in the confining of the cement below the collar.

CAMERON IRON WORKS, INC.

P. O. BOX 1212, HOUSTON, TEXAS

Export: **74 Trinity Place, New York, N. Y.** ***West Texas*** **Odessa, Telephone (1710).** ***Oklahoma:*** **310 Thompson Bldg., Tulsa.**
California: **1442 Hayes Ave., Long Beach (7-2036).** ***Wyoming*** **356 N. Wolcott, Casper.** ***North Louisiana:*** **Bossier City, (P. O. Box 425),**

Wilson-Snyder Plant to Increase Output of Pumps by 50 Percent

Production of oil country pumps for drilling wells and driving oil through pipe lines will go up 50 percent at the Wilson-Snyder Manufacturing Division of U. S. Steel's Oil Well Supply Company at Braddock, Penn., it was forecast with the completion of extensive postwar improvements at this plant.

The plant's entire production system has been streamlined, with the installation of assembly line methods and 40 new machine tools, including two giant electronically-controlled planer type milling machines, automatic turret lathes and an almost entirely new tool room outfitted with modern equipment. Two new overhead cranes are in place, and the shop is illuminated with a newly-developed high intensity lighting system.

Wilson-Snyder receives castings, and steel bars and shapes from associated plants, and machines the pieces into finished parts and assembles them into heavy duty pumps. Most of the plant's 350 men are highly skilled workers with long years of experience in machine tool craftsmanship.

Pride of the shop are the two huge milling machines, which are operated by push-button keyboards held in the hands of workmen. These 200-horsepower machines employ multiple-edged cutters to slice off the rough outer surfaces of big castings and forgings, first step in the plant's intricate machining processes.

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SHALE SEPARATOR
AND SAMPLE MACHINE
Filter depreciation on drilling equipment right out of your drilling mud. The improved Thompson Shale Separators are powered by the flow from the mud pump, efficiently remove destructive shale and abrasives. Clean reconditioned mud returns to work without wear on equipment. SAMPLE MACHINE, included at no extra cost, gives accurate foot-by-foot samples of cuttings. Three sizes are available. Thompson Model "DWF" easily handles maximum flow from the largest mud pump you can buy. Your order can be filled today.
KEEPS DRILLING MUD CLEAN — PROVIDES TRUE SAMPLES OF CUTTINGS

E. O. Buck Named Manager of Oil Loan Department for Houston Bank

E. O. Buck has been named manager of the Oil Loan department of the National Bank of Commerce, Houston, it was announced by A. D. Simpson, president.

E. O. Buck

A native of Arkansas and a graduate of Texas A. and M. College, Buck was a geologist with Gulf Production Company from 1926 until 1931, and later was division engineer for the Texas Railroad Commission in the East Texas oil fields, chairman of the engineering committee of the Conroe Operators Association in the Conroe field, consulting geologist and petroleum engineer in Houston, and from 1941 to 1943 was director of production for PAW in District 3. Since 1943 he has been southern manager for Rowan Drilling Company in the Houston office.

J. W. McCoy, Vice President Of Du Pont Company, Retires

J. W. McCoy has retired as a vice president and member of the executive committee of E. I. du Pont de Nemours & Company but will continue to serve as a director. William H. Ward, general manager of the explosives department, has been elected a director, vice president and member of the executive committee.

McCoy's retirement at the age of 65 brings to a close an active Du Pont career that took him from his first job as a chemist in 1902 to the top level of company management.

C. J. Steward Named Advertising Manager of Dowell Incorporated

Dowell Incorporated, through its general sales manager, R. D. Shaw, announced the appointment of Chad J. Steward as advertising manager of the company.

Steward, a graduate of the University of Tulsa, has had several years' experience in advertising and public relations and has been associated with Dowell sales and advertisement departments since 1941 except for the war years when he served with the Army overseas. He will continue to make his headquarters at the company's general offices.

MANUFACTURERS' AND SUPPLIERS' NOTES

I. W. McKinney Named Factory Representative for Hamilton

I. W. McKinney has been appointed factory representative for Hamilton Rubber Manufacturing Corporation, with headquarters at 2017 Preston Avenue, Houston, the Southern Division offices being at that location.

I. W. McKinney

McKinney attended Rice Institute and the University of Southern California, and has since had 11 years experience in oil production, pipe line construction, and refinery work. Since 1943, he has been in sales and field engineering on industrial mechanical rubber goods.

M. W. Reed Named Chief Engineer For U. S. Steel Corporation.

M. W. Reed, vice president of engineering for Carnegie-Illinois Steel Corporation, has been named chief engineer for the U. S. Steel Corporation of Delaware.

Reed has served with U. S. Steel subsidiaries since 1916, having joined American Steel & Wire Company following his graduation that year from the U. S. Naval Academy. He became vice president of the firm in 1937 and served in that capacity until his appointment as chief engineer of Carnegie-Illinois in 1939.

HOMCO Engineering Staff Holds Luncheon and Business Meeting

Problems encountered during the past year were discussed and new plans made at the annual luncheon and business meeting of the Engineering department of Houston Oil Field Material Company.

Frank Briggs, chief engineer, introduced Glenn Ingles, metallurgist concultant for HOMCO, who talked on the hardenability of steel. Jim Weiler, attorney, explained patent procedure.

Schlumberger Appointments

L. A. Allaud, assistant division manager for Schlumberger Well Surveying Corporation, Tulsa, has been transferred to Venezuela where he will be division manager for Surenco, S. A., in the El Tigre district with headquarters at Oficians. He is succeeded in Tulsa by W. R. Mills, Jr.

Rex Renway, graduate of Wichita University, has been appointed service and sales engineer for Schlumberger at Tulsa.

Cooper Executive Named

H. B. (Buck) Bloxem, who has been associated with Fred E. Cooper, Inc., since 1929, has been named the company's general sales manager.

END
CORROSIVE LIQUID LEVEL PROBLEMS

GAGETRON

Safe, Accurate Remote Level Gauging

Wherever it is impractical to pierce the sides of a vessel; where it is dangerous to permit electrical connections inside a tank; wherever it is necessary to gauge or control a liquid with no physical connection between the liquid and detector outside the tank wall . . . GAGETRON is the complete, accurate answer. (GAGETRON utilizes the principle of Gamma Ray penetration.)

No holes in tank to start leaks of corrosive liquids.

No electrical connections inside tank walls.

May be used either for continuous liquid level reading, or control.

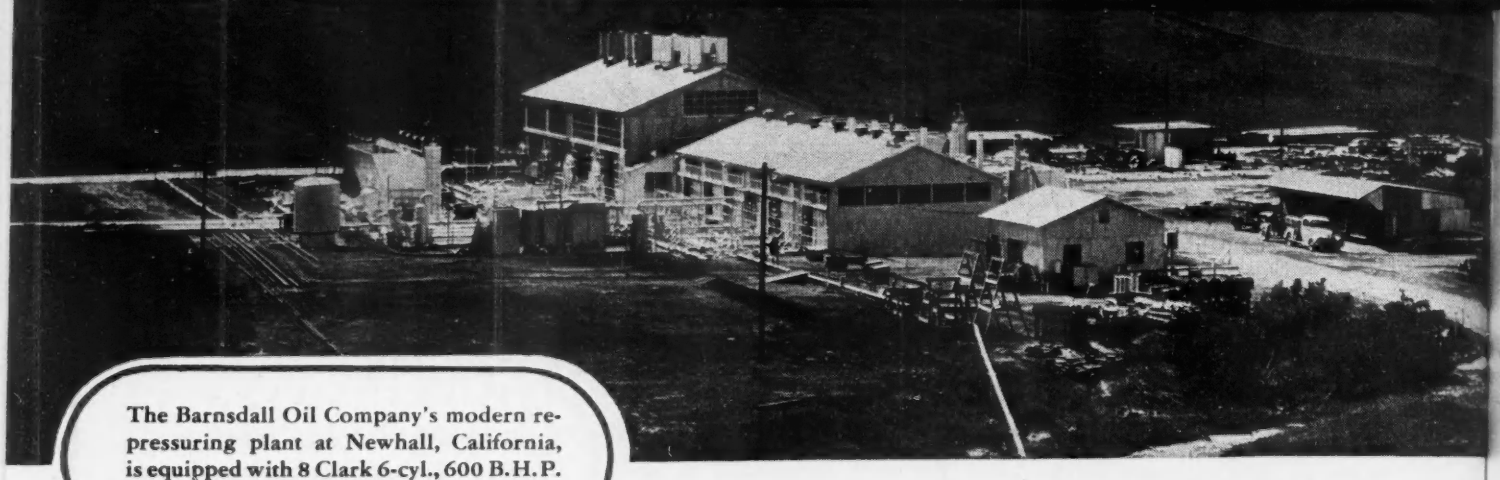
Readings Transmitted to any distance.

Available in explosion-proof housing; safe for use in explosive areas. GAGETRON solves many special liquid level problems.

For GAGETRON'S Application to Your Problems Write, Wire, or Phone.

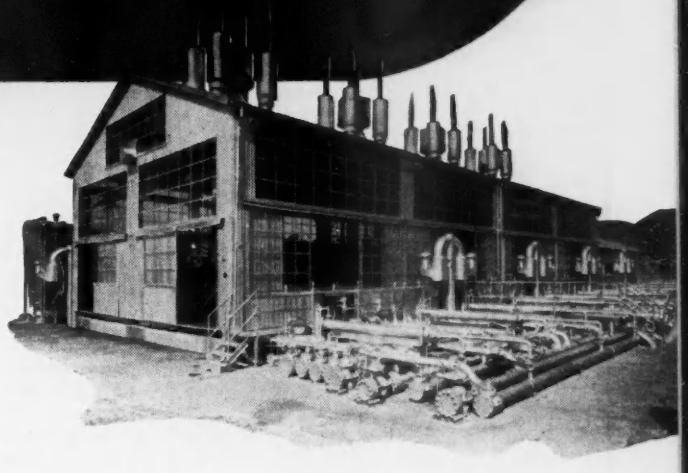
Engineering Laboratories, Inc.
EXCLUSIVE MANUFACTURERS
TULSA 3, OKLA. — GARLAND, TEXAS

Barnsdall equips
plant with



The Barnsdall Oil Company's modern re-pressuring plant at Newhall, California, is equipped with 8 Clark 6-cyl., 600 B.H.P. Right Angle Compressors.

new repressuring Clark "Angles"



BARNSDALL OIL COMPANY employs the most modern repressuring methods in developing its Rancho-San Francisco lease at Newhall, California.

Dry gas is forced back into the sands at the rate of 20,000,000 cu. ft. per day to maintain high rock pressures.

In designing this plant, Barnsdall naturally sought to avoid waste of valuable gas. That meant the plant must be equipped with thoroughly reliable compressors, dependable for continuous operation.

For dependability, efficient operation, accessibility and other important advantages, Clark Right Angle Engine-Compressor units have established a world-wide reputation. Furnished in a complete range of sizes up to 2,000 B.H.P. Write for full information.

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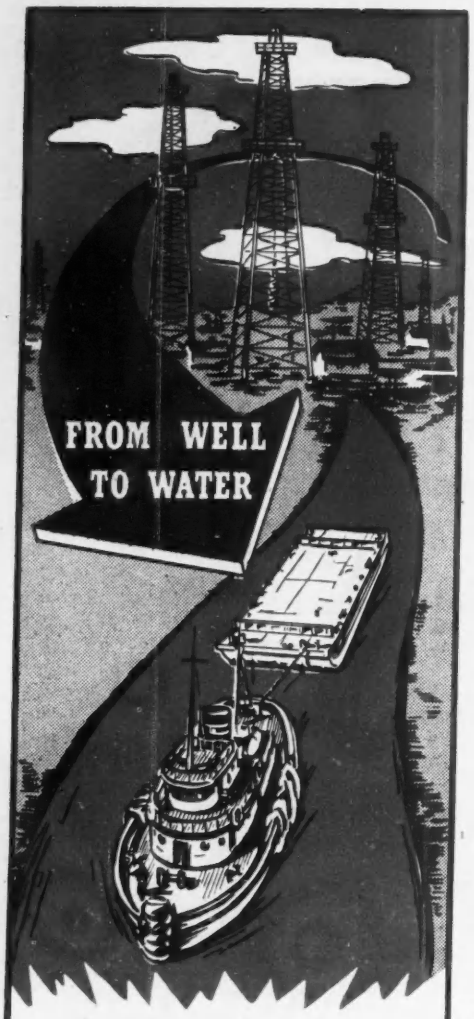
CLARK

ONE OF THE DRESSER INDUSTRIES

SETS THE PACE IN COMPRESSOR PROGRESS



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T. Howard Salter Named Sales Executive for A-1 Bit and Tool

T. Howard Salter was named assistant sales manager of A-1 Bit & Tool Company, Houston, at the district sales managers' meeting in Houston.

T. Howard Salter

A native of Hardin County, Texas, Salter was a roughneck and driller from 1918 to 1932 and then joined Houston Oil Field Material Company as a salesman in the Louisiana district. From 1939 to 1945 he was district manager in Louisiana and Mississippi for Bethlehem Supply Company. After two years with Hunt Tool Company he joined A-1 Bit on June 13, 1947.

He will have headquarters in Houston but will supervise sales in Louisiana and Mississippi.

Spang-Chalfant Booklet Describes Development of Coated Drill Pipe

The story of how the Spang-Chalfant Division of The National Supply Company developed its plastic-coated drill pipe for drilling oil wells in highly corrosive fields is told in a 22-page booklet. The thermo-setting plastic, which is applied to the inside of the pipe, resists the corrosive action of the acids, alkalies and salt picked up by the drilling fluids and thus prevents fatigue cracks that may result in pipe failure and a costly fishing job. The pipe has proved itself in extensive field tests and in drilling of wells since it first became available a few months ago.

Following the success of the plastic-coated pipe for drilling oil wells, Spang-Chalfant has developed a similar coating for tubing used in producing wells, and is continuing its research to adapt the coating to pipe used in many other industries, including home and industrial construction.

The bulletin describes the problem of corrosion fatigue, its economic considerations, history of the development of the new pipe, reasons for the selection of the thermo-setting plastic, results of the field tests and the laboratory test program, and the story of its manufacture. There are twelve photographs.

Copies of the bulletin can be obtained by writing the Sales Promotion Department, The National Supply Company, Grant Building, Pittsburgh 30.

Hewitt Names Distributor

Appointment of the Industrial Equipment Company of Louisville, Ky., as a distributor of the entire Hewitt Rubber Division's line of industrial hose, belting and packing, was announced by J. H. Hayden, vice president in charge of sales, Hewitt-Robins Inc. The Industrial Equipment Company will serve all industries with the Hewitt line within a 45-mile radius of Louisville. William A. Mivelaz is owner of the Industrial Equipment Company.

E. M. Reed Named Vice President Of First National Bank, Houston

E. M. Reed has been elected vice president of the First National Bank of Houston. He became associated with the Bank's oil loan department in 1940 and previously had worked for Gulf Refining Company, Shell Oil Company and Rycade Oil Corporation and had engaged in independent activity. He is a member of AAPG, AIME, Texas Society of Professional Engineers and the Serra Club of Houston.

E. M. Reed

Brown Instrument Company Expands Activities in Rocky Mountain Area

Brown Instrument Company expanded its sales and service activities in the Rocky Mountain area by establishing permanent sales and service representation at 400 Broadway, Denver, and the Atlas Building, Salt Lake City, Utah, it was announced by William H. Steinkamp, field sales manager of the industrial division of Minneapolis-Honeywell Regulator Company.

Donald Larcen has been placed in charge of Denver industrial sales and George Winslow, formerly industrial service manager at Detroit, will handle similar duties in Salt Lake City, where he will work with Eldon Richardson, district manager.

Industrial Engineering Official Named by U. S. Steel President

Benjamin F. Fairless, president, United States Steel Corporation of Delaware, announced the appointment of R. Conrad Cooper as vice president, industrial engineering.

During World War II Cooper served as industry member of the National War Labor Board Steel Commission, and with the War Manpower Commission as management member of the management-labor policy committee. He is a member and past chairman of the industrial relations committee of the American Iron and Steel Institute.

Halliburton Official Named

R. E. O'Donnell, formerly superintendent for Halliburton Oil Well Cementing Company in the West Texas-New Mexico division, has been placed in charge of the new public relations office in Fort Worth.

Ideco Manager Named

Ernest C. Begley, has succeeded Dick Gordon as manager for International Derrick and Equipment Company at Seminole, Okla. Gordon is now associated with Parkersburg Rig and Reel Company.

MANUFACTURERS' AND SUPPLIERS' NOTES

Former Nuwell Tool President Now With Cameron Iron Works

John Grubb, former president and general manager of Nuwell Tool Company, has joined the Cameron Iron Works sales department, effective with the purchase of the assets of Nuwell by Cameron on December 1.

John Grubb

In recent years Grubb has been identified with such prominent oil field equipment firms as Baker Oil Tools and Broderick-Bascomb Wire Rope Company. He will specialize in the sale of Cameron-Nuwell cementing shoes and collars and will be located at the company's Houston headquarters.

Oil Center Tool Constructing Engineering, Research Building

Oil Center Tool Company took the first step in a $150,000 expansion program when construction was begun on a $50,000 engineering and research building. It will house the company's engineering department and will include within its 1800 square feet of production space new facilities for research.

Tube Turns Promotes Two

Two promotions have been announced by Thomas H. Pike, Jr., assistant sales manager of the Welding Fittings Division of Tube Turns, Inc., Louisville. Norton P. Bosemer has been placed in charge of the Los Angeles office and Robert S. Tyler, Jr., has been placed in charge of a newly established Mid-Continent district at Tulsa.

Dow Agent Named

Saran Lined Pipe Company, a new firm, will be exclusive distributor for The Dow Chemical Company's recently developed specialty pipe and fittings.

The pipe and fittings, lined with Saran, a Dow plastic, was developed for use where highly corrosive materials are handled in manufacturing processes.

Bethlehem Names Representative

H. L. Hawkinson, Jr., was promoted to local representative for machinery sales in the Houston sales office of Bethlehem Supply Company. Hawkinson, formerly field representative at Odessa, Texas, has been employed by the company 6½ years.

Sperry to Relocate

Sperry Products, Inc., manufacturers of supersonic and electrical non-destructive testing and measuring instruments, will move its manufacturing plant and general offices from Hoboken, N. J., to Danbury, Conn., during the summer of 1948. A 20-acre site has been acquired and construction of a monitor-type manufacturing building and a three-story office building will begin immediately.

Slow-ups in the Oil Industry delay production, and cost you money.

Speed up your operations by using First of Tulsa for your oil financing. We speak your language, know your problems, and are prepared to act quickly.

1st of Tulsa

THE FIRST NATIONAL BANK AND TRUST COMPANY OF TULSA

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

BUFFALO BOLT MEN MEET—Executives and field representatives of the Buffalo Bolt Company and its four affiliated companies attended the 1948 sales conference in Buffalo, N. Y., in January. Represented at the conference in addition to the parent Buffalo Bolt Company were The S. M. Jones Company, The Eclipse Lawn Mower Company, Penberthy Injector Company, and Buffalo International Corporation.

Link-Belt Firm Appoints Sales Engineer for Dallas District

Link-Belt Company announced that John Yetter has been appointed district sales engineer, Ball & Roller Bearing Division, with headquarters at the plant in Dallas.

Yetter is a graduate of Texas A. and M. College and went immediately into the Air Corps. After considerable work in Air Corps engineering at Wright Field, he transferred to flight training and later was a B-24 bomber pilot flying out of Italy.

He joined the Link-Belt organization about two years ago and spent most of a year in training at the company's Ball & Roller Bearing Division plant in Indianapolis before being transferred to the Southwest.

Republic Steel Names Assistant To Vice President of Operations

Appointment of Giles R. Locke as assistant to the vice president in charge of operations, Republic Steel Corporation, has been announced by E. M. Richards, vice president. Locke assumes the post formerly held by the late William M. Neckerman, in connection with development and production of pipe and tube for oil and gas field and pipe line use.

Locke graduated from the University of South Dakota in 1925 and joined Empire Gas and Fuel Company as a junior engineer. In 1927 he was assigned to special problems in the oil and gas industry. In 1929 he became associated with The Natural Gas Pipe Line Company of America, after which he joined Republic as special representative of tubular products.

Changes in Field Personnel Made By Bethlehem Supply Company

Bethlehem Supply Company announced several changes in field personnel.

H. L. Phillips, formerly field representative at Salem, Ill., has been promoted to store manager and field representative at Salem, replacing R. L. Collins, who was transferred to the Tubular Goods department in the general office at Tulsa. A. B. Croisano, formerly floorman at El Dorado, Kansas, has been promoted to store manager and field representative to replace F. W. Jensen, who has been transferred as special representative to the Kansas district office at Wichita.

N. D. Lee, who has been field representative in the Used Material department at Kilgore, has been transferred to the Sales department as special representative at Kilgore to perform sales and service work. W. A. Langbein, formerly store manager and field representative at Kermit, has been transferred to Odessa as store manager and field representative to replace R. O. Hall, who will now concentrate his efforts on sales work as field representative. C. E. Noland, formerly field representative at Kermit, has replaced W. A. Langbein as store manager and field representative.

August R. Maier

Alexander Quayle

Chief Engineer and Director of Engineering Named by Oil Well

Appointment of August R. Maier as director of engineering and of Alexander Quayle as chief engineer of Oil Well Supply Company was announced by Fred F. Murray, president of this U. S. Steel subsidiary. Maier's new headquarters are at Dallas. Quayle will remain at Oil City, Penn.

A native of Germany, Maier was naturalized as an American several years after his graduation from Stuttgart Institute of Technology. He became associated with the oil industry in California, and joined Oil Well in 1930 as a development engineer at the company's Wilson-Snyder Manufacturing division at Braddock, Penn. He was transferred to Dallas as assistant chief engineer in 1932 and was named chief engineer four years later. His headquarters were moved to Oil City in 1941.

Quayle is a native of New York. He was graduated from Stevens Institute of Technology before joining Oil Well as a field service engineer. His most recent position with the company was assistant chief engineer.

Wire Rope Sales Department Created by R. G. LeTourneau

R. G. LeTourneau, Inc., Peoria, Ill., has created a wire rope sales department as part of the Corporation Sales division. LeTourneau will incorporate a full line of sizes, types and construction of preformed and non-preformed wire rope under the trade name, Tournarope.

Direction of sales will be under the supervision of W. H. Wilson, wire rope sales manager. Assisting him will be Michael R. Kahle and Alvin J. Becker, sales engineers.

Crawford H. Greenewalt Becomes President of du Pont Company

Crawford H. Greenewalt has become the tenth president of E. I. du Pont de Nemours & Company, and Walter S. Carpenter, Jr., was elected chairman of the board. Carpenter's resignation as president, and his designation as chairman of the board, followed the retirement of Lammot du Pont from the latter post. Du Pont's action brings to a conclusion a career in the company that began in 1902.

In addition to assuming the presidency of the company, Greenewalt became chairman of the executive committee, of which he had previously been vice chairman, and a member of the finance committee.

Du Pont will continue as a member of the board, while Carpenter retains his membership on the finance committee.

Walter J. Beadle, a vice president and member of the board, has resigned as treasurer and has been elected to membership on the executive committee. T. C. Davis, who had been first assistant treasurer, was elected treasurer.

Bendix Agent Appointed

Trevor G. Boyce has been named factory representative for Bendix Aviation Corporation, Eclipse-Pioneer Division, with offices in the Merchant Exchange Building, Houston, for sales and service of seamless flexible metal hose. Boyce attended Dartmouth and the University of California, where he majored in natural gas chemistry.

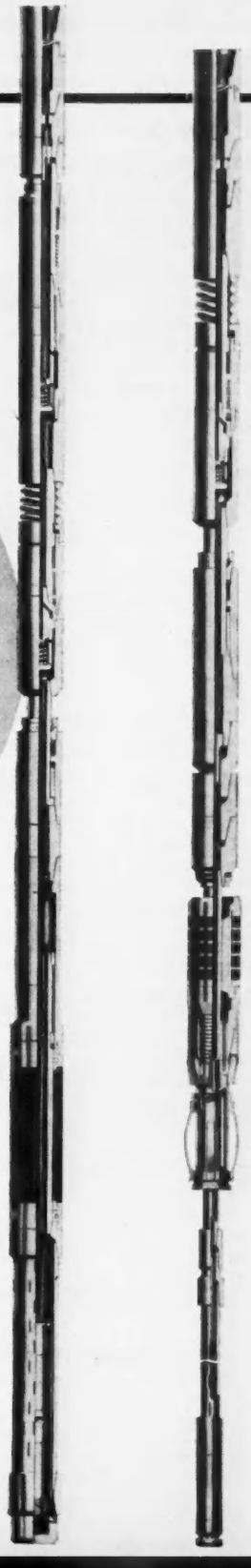
FORMATION AND JOHNSTON CASING TESTING

means

Safety

Accuracy

Reliability



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And to complete the picture, the Johnston Pressure Recorder charts *all* pressures going in and coming out of the hole, including hydrostatic pressure of fluid column, flow pressure and bottom hole shut-in pressure.

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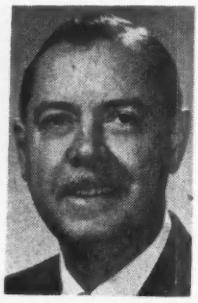
FORMATION AND JOHNSTON CASING TESTING

Brooke Todd, General Manager of Beaumont Well Works, Resigns

Brooke Todd, for the last five years general manager of Beaumont Well Works Company, Beaumont, Texas has resigned.



Brooke Todd

Todd is well known in the Gulf Coast area as a designer and producer of steel forgings for oil field drilling and producing equipment manufacturers. Prior to going with the Beaumont Well Works he was general manager of Oil City Brass Works, also of Beaumont.

After a short vacation, Todd stated that his future activities would probably be in the same line of endeavor as that of his former company.

Personnel Changes Announced By Oil Well Supply Company

Several changes in Oil Well Supply Company personnel have been announced by K. B. Winstead, Central Midwest division manager for this U. S. Steel Corporation subsidiary.

Wayne B. Atkins, manager of the McCamey, Texas, store since March, 1947, has been appointed manager of the Big Spring, Texas, store. He is succeeded at McCamey by Joseph M. Rogers, transferred from Denver City, Texas, where he held a similar position.

Carrol R. Jones, city representative at Midland, Texas, since January, 1946, has been named manager of "Oilwell's" store at Wichita Falls, Texas.

At Albany, Texas, Lloyd H. Fielder, who has been manager of that city's store since October, 1944, has been appointed assistant district engineer, subsurface equipment, with headquarters at Albany. His successor is M. F. Wellman, storeman in the Albany store for the past two years.

Headquarters of C. R. Evans, district engineer, refinery and pipe line equipment, have been moved from Big Spring to Odessa, Texas.

Executive Appointments Made For Link-Belt Company Plants

Columbus Basile has been appointed superintendent of Link-Belt Company's Caldwell plant at 2410 West 18th Street, Chicago.

Leonard C. Heinlein has been named to the newly-created position of assistant superintendent at the company's Ball & Roller Bearing Division plant in Indianapolis.

Basile joined Link-Belt's Pershing Road Chicago plant in 1928. For the last three years he has been in charge of time study and methods at the Philadelphia plant.

Heinlein entered the employ of the Indianapolis plant in 1926. After holding positions in various departments, he entered the engineering department of the anti-friction bearing division in 1939 and has since been engaged on the design and application of these bearings.

Engineering Firm Formed

P. T. Amstutz, Jr., formerly head reservoir engineer for The Standard Oil Company (Ohio), and G. L. Yates, formerly head valuation engineer for the same firm, have organized the firm of Amstutz & Yates, Inc., consulting reservoir and valuation engineers. Offices are in the KFH Building, Wichita, Kansas.

First National of Fort Worth Names Vice President, Director

The board of directors of First National Bank of Fort Worth elected E. G. Parker, vice president, to the board, and promoted R. T. Mayfield to a vice president, it was announced by M. A. Fuller, bank president.

Parker has ben connected with First National since 1926 and will continue his duties as vice president.

Mayfield, formerly an assistant vice president, has served the bank in all departments for over 28 years.

Twelve other promotions were made at this time and the remaining directors and officers were reelected.

Branch Personnel Changes Made By International Harvester

W. K. Perkins, manager of sales, International Harvester motor truck division, has announced the following changes in branch personnel:

R. L. McCaffrey, formerly sales promotion man at Lincoln, Neb., has been appointed assistant manager at that branch. McCaffrey was a parts man in the Chicago truck branch in 1939 and later became a retail truck salesman. He was transferred to Lincoln, Neb., in 1941 and served in various capacities until called for military service in December, 1943. Upon completion of military service in May, 1946, he returned to Lincoln as a blockman, later becoming a sales promotion man, in which capacity he served until his recent promotion.

J. R. Scott, formerly assistant manager at Lincoln has been transferred to Grand Island, Neb., in the same capacity. Scott's service with Harvester dates back to 1931 at Sioux City, Iowa. In 1936 he was transferred to Lincoln, Neb., and the following year to Fargo, N. D. In 1940 he became sales promotion man at Minneapolis, Minn., and in June, 1944, he was promoted to assistant manager at Lincoln.

Charles H. Tate Firm Named Edward Valves Representative

Appointment of the Charles H. Tate Company, Cleveland, as representative of Edward Valves, Inc., for northern Ohio and Erie County, Penn., has been announced by W. F. Crawford, Edward president.

At the same time the Tate Company added J. M. Watson to its sales engineering staff. Watson, formerly of the Bailey Meter Company, will specialize in the Edward line of cast and forged steel valves.

C. Lee Cook Manufacturing Firm Appoints Houston Sales Agent

The C. Lee Cook Manufacturing Company, Louisville, Ky., announced the association of T. F. Hudgins with its Mid-Continent agent, the Woobank Machinery Company, Tulsa.

Hudgins was former vice president and sales manager for the Cooper-Bessemer Corporation and later was export sales manager for Clark Bros. Company.

Headquarters for his new post will be in the Kress Building, Houston.

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12—NEW 10 KW, .80 Power Factor, Light Plants, A-C, 120-240 Volt, Single Phase, 60 Cycle. Generator direct connected to Four Cylinder "JEEP" Engine. Steel Skid Mounted, 12 Volt Electric Start with Battery, Panel Board, Spare Parts and Hand Tools, EXPORT CRATED F.O.B. San Antonio Texas. $980.00 each. Shipping weight 2060#.

36—NEW 3" Two Stage Byron Jackson "PUP" Centrifugal Pumps Direct connected to Chrysler C-36, Ind. 9, 8-Cyl. Engine. Steel Skid Mounted, Engine fully enclosed with Panel Board, Electric Start and Battery. EXPORT CRATED with spare parts and hand Tools F.O.B. Tulsa, Oklahoma. $875.00 each. Shipping weight 4060#.

Halloran Equipment Co., 431 Kress Bldg., Houston 2, Texas. Phone Capitol 1447.

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■ 1—15,000 Foot Power Rig Complete, Bethlehem MC-950 Drawworks with 4-383 HP 6 G-510 Superior Gas Butane Drilling Engines; 2 Pumps; 1—12,000 Foot Power Rig Complete w/Bethlehem MC-650 Drawworks with 3-LRO Waukesha Engines; 2 Pumps; 1—12,000 Foot Steam Rig Complete w/14x14 Ideal Ajax Engine; #12 Beaumont Iron Works Drawworks; 3—20" Pumps; 4—Boilers.
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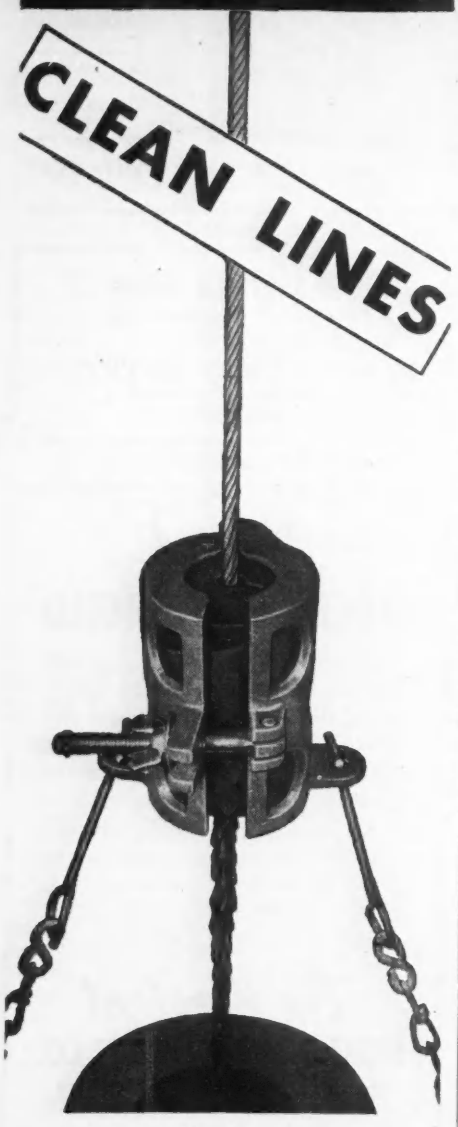
CLEAN LINES



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SQUEAKS from the BULLWHEEL

True, True

"Mamma, do people that lie ever go to heaven?"

"Why, of course not."

"Gee! I bet it's lonesome up in heaven with only God and George Washington."

In a Minor Key

First ghost: "How did you get the black eye?"

Second ghost: "I was slipping through a key-hole when somebody put the key in."

Life Is Like This

"I'm glad to find you as well as you are," said the old friend. "Your great wealth hasn't changed you."

"Well," replied the candid millinoaire, "it has changed me in one thing. I'm now 'eccentric' where I used to be impolite, and 'delightfully witty' where I used to be rude."

Now They're Toasted

"We're the Chesterfield boys. We're mild, but we satisfy."

"We're the Piggly Wiggly girls. We have everything, but we don't deliver!"

Intoxicating Lady

"You bad, naughty boy," giggled the coy lady. "Don't you dare kiss me again."

"I won't, lady. I'm just trying to find out who has the bourbon at this party."

Veto Awaited

Two men were working on the White House lawn, each supplied with a small push cart upon which was a garbage can. They walked about picking up papers with a long spear. One spied a piece of toilet paper and started to spear it, when suddenly a gust of wind came up and blew the paper into the White House through an open window.

The man became frantic and rushed into the building. He returned shortly and said: "I was too late. He had already signed it."

Rough in the Clutches

"Whassa matter, Flo?"

"Gawd, Mae! Don't ever go out with a chiropractor."

This Curious World

She wears black garters in memory of those who have passed beyond.

Clothes make the man; with a woman, they just show how she's made.

He's the kind of a guy who, when his girl offers him a nightcap, always wants to make it a pajama party.

Best way to drive a baby buggy is to tickle its little feet.

Give a pessimist a piece of rope and he'll hang himself. Give an optimist a piece of rope and he'll start a cigar factory.

Overheard: "No, I didn't say you're a perfect idiot. After all, nobody is perfect."

Hints for Householders

A man about to be electrocuted phoned his lawyer from the death chamber. "They are about to put me in the electric chair," he said. "You are my lawyer—what do I do now?" The lawyer answered helpfully, "Don't sit down."

The Woman's Way

He was reading a letter from his wife.

"This is what I get for marrying a school teacher," he told his friend. "Listen to this!

"'Dear Tim: I notice that you have written me "Dearest Lucy." Now, either your grammar is bad, or else you are not a good husband. If I am the only Lucy you have, the "Dearest" is not correct: and if you have more than one Lucy, you've got something to explain when you get home.'"

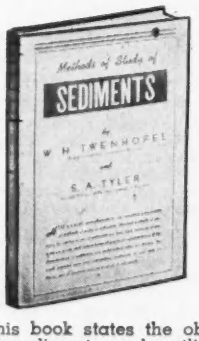
A Woman's Ego

Susie (just home from a date): "Hot dog! That fellow Johnny had everything!"

Jane: "What do you mean, he had everything?"

Susie: "He must have had everything; he didn't ask me for anything."

METHODS OF STUDY OF SEDIMENTS



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SQUEAKS from the BULLWHEEL

Poet's Nook

There was a young lady named
Etta
Who was fond of wearing a tight
swetta.
Three reasons she had—
To keep warm wasn't bad
But the other two reasons were
betta.

Encore

Both women and pianos.
Are similar in brand;
Some of them are upright
And some are simply grand.

Encore Some More

A sultan annoyed with his harem
Thought of a way he could scare'm.
He caught a small mouse
Which he freed in the house,
Thus starting the first harem-scarem.

Strictly Civilized

One day while in the jungles a marine ran into a tribe of cannibals. The head of the tribe confided to the Yank that he once attended college in the U. S.

"Do you mean to say," asked the marine, "that you went to college and that you still eat human beings?"

"Oh, yes, but, of course, I use a knife and fork now."

The Woman's Way

Employer, to beautiful blonde who had filled in job application: "Miss Jones, under 'Experience' could you be a little more specific than just 'Oh, Boy'?"

Cause for Firing

When he arrived at the office, sleepy and grumpy, his pretty secretary greeted him with a smile. "Hello, Boss. How do you feel this morning?"

"Terrible! Didn't sleep a wink all night. And by the way, Miss Jones, next time you come into my dreams, try not to be wearing a pink silk nightgown."

The Better Way

A man ordered a pair of striped trousers from his tailor, who took six months to complete them. The man was furious, and exclaimed:

"It took only six days to create the world, but you take six months to make one pair of pants."

"You're certainly right," the tailor replied, "but look at the world and then look at these pants."

Exit Contractors

Sometimes this drilling contracting business gets us all confused.

The oil producer is turning to the drilling contractor to get his wells drilled. No doubt about that. Eighty percent of the wells are drilled by contractors.

The drilling contractor is going into the oil-producing business in order to get funds to finance his drilling contracting losses. About 90 percent of the drilling contractors in the U. S. own some production.

As soon as a contractor gets a sizable hunk of production he goes out of the contracting business!

This is printed on the joke page, but "it ain't no joke!"

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